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Three Chirurgical  
**DISSERTATIONS.**

The First

By Mr. **C H I R A C**,  
Chief Physician to the King of *France*.

IN WHICH

- I. The different Natures of WOUNDS are considered.
- II. Their SYMPTOMS are enumerated and accounted for, from the Laws of the animal Œconomy, and the justest Principles of Mechanism.
- III. Their Diagnostics, and Prognostics, are accurately laid down.
- IV. The best and most rational Method of treating them, whether SIMPLE, or COMPOUND, is specified.

THE OTHER TWO

By Mr. **F I Z E S**,  
A celebrated Professor of Physic and Surgery in the  
University of *Montpelier*.

IN WHICH,

- I. The Doctrine of SUPPURATIONS, and of ULCERS, is set in a clear and rational Light.
- II. Their Causes, Differences, Symptoms, Diagnostics, Prognostics, and various Terminations are specified and explained.
- III. A Method of Cure is established by Reason, and confirmed by Experience.

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The whole Translated from the Originals.

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L O N D O N:

Printed for W. OWEN, at *Homer's-Head*,  
near *Temple-Bar*. 1750.

Three Chinese

# DISSERTATIONS

The First

BY MR. C. H. R. A. C.

Translated to the King of France.

IN WHICH

The Nature of Wounds and

Their Treatment are

Explained and

Illustrated by the

Author.

The Second

Of the

Use of the

THE OTHER TWO

BY MR. W. A. S.

Translated to the King of France.

University of Medicine.

IN WHICH

The Nature of

Their Treatment are

Explained and

Illustrated by the

Author.

The Third

Of the

Use of the

Author.

The Fourth

Of the

Use of the



T H E  
P R E F A C E.



O say that Mr. Chirac is the author of the dissertation on wounds, the translation of which we now offer to the public, is almost equivalent to saying, that the present work contains a noble series of thoughts and reasonings, highly proper, if not absolutely

*solutely necessary, for every one who wants to be acquainted with the theory of surgery, and to form such clear and distinct ideas, as may serve him for sure and faithful guides in the treatment of those disorders, which are only to be cured by manual operation.*

*'Tis certain, that Mr. Chirac is one of these happy and exalted geniuses, who almost continually light on truth, and to whom nature seems to have deigned to reveal the most secret mysteries of her operations, charging them, as it were, to dispel the dark, and gloomy clouds, which conceal her glorious and admirable mechanism from the eyes not only of the vulgar, but also of those who pretend to make a figure in the learned world. Born at once with a sprightly genius, and a solid judgment, he was not satisfied with simply observing things, but was equally fond, and  
equally*



# P R E F A C E.

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*equally skilful in applying his observations to the best of uses. Beginning first by drawing from them such consequences as were most evident, and offered themselves, as it were, spontaneously, he used those as new principles, which by the consequences he naturally deduced from them, furnished him with a noble store of beautiful discoveries.*

*Among the several works, written by Mr. Chirac, there is none more proper to evince the elegance and strength of his reasoning, than the present dissertation; a work, which according to the Testimony of Mr. Fontenelle, in his character of Mr. Chirac, charms all real judges by the solidity of the thought; and, 'tis certain that the richness of the matter abundantly compensates for the simplicity of the stile.*

*The whole work is nobly calculated, not only to give clear ideas of*  
*the*



*the nature of wounds, but also to furnish surgeons with distinct views of other subjects; to convince them of the necessity of reasoning in medicine and surgery, and to shew them the danger of constantly following the common practice, which very often proves fatal to the patients. Of this the reader may see the most forcible examples in the tenth chapter, where the author shews the absurdity of mixing the powders of myrrh and aloes with digestives, and where he clearly demonstrates the great consequence of varying the treatment of gangrenous parts, according to the different degrees of the mortification with which they are affected.*

*The two dissertations of Mr. Fizes, on the suppuration of the soft parts, are universally approved of by the most judicious physicians and surgeons.*

geons. They contain a noble and solid theory, established on the most exact and intimate acquaintance with the mechanism of the animal oeconomy, and supported upon a great number of facts observed in a long series of practice.

Almost every thing advanced by Mr. Chirac is founded, either on the observations made before him, or on such as he himself made upon wounds; for to begin with the first chapter, which treats of the nature and difference of wounds, we find all the differences there specified, to be established on experience, as well as the symptoms of wounds, explained by the author in a physical manner, in the second and third chapters. The diagnostic and prognostic signs, laid down in the fifth and sixth chapters, are also for the most part founded on what

*we observe, either in the lesion of the functions, the quality of the matter discharged from the wound, the nature, the form, and the extent of the wound, and of the instruments which have produced it, in the temperament of the patient; or, lastly, in the character of the symptoms, which accompany or succeed a wound. All that the author proposes on the treatment of wounds, whether simple or compound, in the subsequent chapters, is so evidently founded upon observation, that it may more properly be called a series of observations, furnished by a long and happy practice.*

*These observations are not indeed detached from each other, like those contained in a great many collections, which may be justly compared to a confused heap of materials of all sorts, which, if they were arranged by some skilful*

*skilful hand, would form a grand and magnificent building.*

*Those of Mr. Phizes are all so united with each other, as to concur to the establishment of a solid and unexceptionable theory, without which it is as impossible for a surgeon to conduct himself as he ought, in the treatment of wounds, tumors, and ulcers, as it would be for a pilot without the assistance of his compass, to avoid the shelves and rocks of a dangerous sea.*







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T H E

CONFIDENTIAL  
MEMORANDUM

TO: [illegible]  
FROM: [illegible]  
SUBJECT: [illegible]

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A  
DISSERTATION  
ON  
WOUNDS.

*In which an enquiry is made, whether aqueous liquors rendered deterfive by means of salts, ought rather to be used than other sarcotic medicines composed of oils, and pinguious substances, in order to procure a cicatrix in wounds after the cessation of the suppuration.*

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CHAP. I.

*Of the nature and differences of wounds.*

**B**Y the word *wound* we generally mean any division, or solution of continuity, in the organized parts of the body: it is, however, customary among medicinal writers to restrict the word *wound* to such solutions

B

lutions



solutions of continuity as happen in the soft parts, and especially such as are produced by the action of hard and weighty bodies thrown, darted, or applied to the soft parts in any other manner capable of destroying their union. For this reason we exclude from the number of *wounds* all such divisions of the soft parts as are produced by the insensible motion of the humours contained in the body itself, or occasioned by the external application of corrosive liquors, since such divisions are called *ulcers*.

THE difference of the respective methods necessary to be used in treating *wounds* and *ulcers* sufficiently convinces us, that the ancient surgeons had just reason to distinguish the former from the latter. For the same reason they also made a distinction between such solutions of continuity as happened to the solid parts, that is, the bones, and the *wounds* and *ulcers* of the soft parts; for though these different species of division or solution of continuity should depend equally on the same causes, yet they require very different methods of treatment. For this reason we with the ancients give the name of *wound* to all solutions of continuity, produced in the soft parts of the body by the impulsion or action of hard and weighty substances. We  
con-

confine the name of *ulcers* to solutions of continuity, produced in the soft parts by the action of the humours contained in the body itself. We shall also use the general name *fracture* to denote the divisions of the solid parts, occasioned by the action of hard bodies; and under the name *caries* we comprehend such solutions of continuity as are produced in the bones by the acrimonious and corrosive state of the humours.

BUT as *wounds*, of which we at present intend to treat, both with respect to the principles of theory and practice, are of different forms, according to the different bodies, or rather the different action of the bodies, which produce the solutions of continuity in the soft parts, it is expedient previously to enumerate some essential differences observable in *wounds*. *Wounds* then are either made by cutting or pointed instruments, which produce divisions of the parts by acting like wedges; and the *wounds* of this kind we shall call *incisions* or *punctures*; or *wounds* are made by bodies, which are neither pointed nor cutting, but which only acting by their weight, and being propelled with force against the soft parts, compress them strongly according to the line of

## 4 A DISSERTATION

direction in which they move, and by this means destroy the mutual cohesion of the parts; and the *wounds* of this class are called *bruises*, or *contusions*; of this kind are those made by fire-arms, blows of stones, sticks, &c.

WOUNDS differ, not only with respect to the instruments which inflict them, but also with respect to the parts in which they are made; for some *wounds* are not only apparently, but also in themselves more simple than others of a more complicated nature; and both these kinds require different remedies, for which reason we shall distinguish *wounds* into those of the *simple* and those of the *compound* kind. There are *three species* of *simple wounds*. The *first* includes those *wounds* in which the parts are either punctured, cut, or contused. The *second species* comprehends those *wounds* in which the skin is only cut, or in which, supposing they penetrate deeper, there is neither a loss of substance, nor an aperture of large vessels. And the *third species* of *simple wounds* includes those which are not accompanied with any troublesome or dangerous symptoms. We also establish *three classes* of *compound wounds*. In the *first*, the parts are either punctured, or cut at the same time, or even  
contused

contused and bruised. In the *second* the skin is not only divided, but there is also a greater or smaller loss of substance, or some large vessel, some nerve, or tendon affected. The *third species* of *compound wounds* includes those which are made by envenomed or poisoned instruments, or which are accompanied with troublesome symptoms, such as inflammation, intense pain, itching and heat.

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## CHAP. II.

### *Of the symptoms of wounds.*

#### SECTION I.

**A**S the soft parts cannot be cut without a division of the vessels which compose their texture, and as these vessels must consequently discharge the blood which flows in their cavities, it is sufficiently obvious why *wounds*, made by incision, are accompanied with hemorrhages; and as the quantity of blood which is conveyed through the vessels to the wounded part, bears a proportion, every other circumstance being alike, to the diameters of these

## 6 A DISSERTATION

vessels, it consequently follows, that the larger the divided vessels are, the more considerable the hemorrhage must be.

### SECTION II.

**I**N *wounds* made by contusion, the hemorrhage is never so copious, as in those made by puncture or incision. The reason of this difference is, because the vessels not being cut in contusions, but broken and torn, their extremities do not remain entirely open; for having been bruised, contused, and as it were cauterised by the action and impetuosity of the bodies which strike upon them, they contract themselves, and shrink up in such a manner, that the blood is not so easily discharged from their orifices, as from those of vessels which are divided with a sharp instrument, and which have retained their natural diameters.

### SECTION III.

**T**HE soft parts cannot be cut, punctured, or contused, without producing a strong compression of the nerves which enter their texture. Now the nerves cannot be compressed, agitated, or stimulated, without forth-  
with



with exciting an impetuous reflux of the nervous fluid to the brain, by which the medullary substance of that organ must be violently agitated, and even the particular part of that substance, to which the reflux is made, be in danger of suffering a solution of continuity; which is the true cause of every painful sensation. Hence it is obvious, that incisions, punctures, and contusions, must be accompanied with a pain, which is more or less intense, according as the nerves of the wounded part are more or less stretched; for it is certain, that the greater tension and elasticity the nervous fibres are possessed of, the more susceptible they are of the agitations and vibrations communicated to them by the bodies which act upon them. Hence the animal spirits return to their source with greater force and velocity, and thus produce a more intense pain. For this reason the *wounds* of tendons, membranes, ligaments, or even of the teguments, are much more painful than those of muscles and glands, because the contexture of these two last is much more lax than that of the others.

## SECTION IV.

**I**N punctures and incisions, the lips of the *wound*, and the parts adjacent, must necessarily become tumid and inflated for the following reasons. When any part has been punctured or cut, not only the nervous fibres, but also the vessels which compose it have also been cut, and by their natural spring and elasticity, shrink back, and assume, round the lips of the *wound*, a disposition and arrangement different from what they had in their natural state; by which means they compress the adjacent vessels, and consequently form an obstacle to the free circulation of the blood and lymph in the lips of the *wound*: hence it happens, that the quantity of the blood and lymph which ought to be naturally conveyed into the shrunk-up vessels, as well as into those which are compressed, finding no longer a free passage into them, flows into the lymphatic and blood vessels of the adjacent parts, and augmenting the quantity of liquors therein contained, enlarges their diameters, distends them, and, by a necessary consequence, renders the lips of the *wound*, and the parts adjacent, tumid.

BESIDES

BESIDES, the vascular ramifications either in the lips of the *wound* or parts adjacent to them being distended, must compress those contiguous to them, or at least their branches, and by this means create a resistance to the blood conveyed to the lips of the *wound*. Hence it is easy to comprehend, why in consequence of the interrupted return of the blood through the veins, whilst fresh blood is continually conveyed through the arteries, the whole vascular plexus round the lips of the *wound* should be inflated, and form a tumour, which spreads gradually, and extends itself to parts at a considerable distance from the *wound*.

THIS tumour is accompanied with heat, redness, pulsation, fever, and consequently an inflammation, which consists in the union or conjunction of all these. In order to discover the cause of all these symptoms, it is to be observed, that the blood remaining in the lips of the *wound*, and parts adjacent, insensibly permits its most subtile, moveable parts, which give it a due degree of fluidity, to fly off; and that by this means, becoming more thick, its saline as well as sulphureous parts adhering to each other, form molecules of a larger size. Besides, the animal spirits are determined to  
flow

flow the more copiously to the part affected, the more violently they have been propelled or forced from it to the brain. These spirits being thus conveyed in large quantities into the cavities of the lymphatic and blood-vessels, mix themselves with the humours therein contained and inspissated, and like so many small and highly moveable wedges, agitate and put them in a fermentative motion, which is the more violent, because many of these fermentative parts adhering together, have acquired a larger bulk than they had in their natural state. Now heat only depends on the motion of fermentative parts sheathed up in parts of a sulphureous kind; and the greater the motion of these parts are, the more intense the heat must also be. It is not therefore surprizing, that the fermentative parts of the blood remaining in the lips of a *wound*, being much more rapidly agitated than they were before the reception of the *wound*, should excite an uneasy sensation of intense and burning heat.

UPON this fermentative motion also depends, in some measure, the redness of the lips of *wounds*: I say in some measure; for the too great quantity of blood conveyed to these parts also generally concurs to the production of this.

This effect, since no parts but such as have blood conveyed to them appear red. But to return to the fermentation of the blood, it is certain, that the greater this is, the more it divides and separates the red globules; which consequently presenting more surfaces to the rays of light, for that reason reflect more of them. Now as it is certain that the liveliness of a colour only depends on the number of rays reflected, hence it is equally obvious, that the great degree of fermentation happening in the blood, lodged in the lips and adjacent parts of a *wound*, must necessarily render the red colour of these parts more lively.

As for the painful pulsation perceived in the lips and adjacent parts of *wounds*, it is a necessary consequence of the obstruction or compression of the arterial ramifications distributed through them; for the blood arriving continually through the large trunks of the arteries, and not being able to continue its free passage into their ramifications, is accumulated in these trunks and distends them. The sides of the arteries thus distended suffer still a farther degree of dilatation, and beat more strongly than usual, at every contraction of the heart. This violent beating or pulsation agitates or  
gives

gives alternate shocks to the blood accumulated in the lips and adjacent parts of *wounds*, and consequently excites a pain which is not continual, but is perceived at certain intervals, that is at each pulsation of the arteries.

LASTLY, the fever accompanies all these symptoms, because the blood lodged in the lips and adjacent parts of a *wound*, cannot ferment violently without many of its parts making a passage for themselves, by means of numberless small vessels of communication, into those veins which are neither compressed nor obstructed, whence they are conveyed to the heart with the reflux blood. This mixture of the fermentative parts with the common mass of blood, must necessarily so alter its natural fermentation, and augment it to such a degree, that all the functions of the animal œconomy must be disordered by it. Now this augmentation of motion constitutes the very essence of a fever.

## SECTION V.

SOME *wounds* become œdematous, that is, there happens to them a soft transparent inflation, which is destitute of sensation, and retains any impressions made in it by the finger

finger, for some time. This symptom happens in patients, whose blood naturally contains a redundance of serum; for if blood of this kind is lodged about the lips of *wounds*, a great many of the aqueous parts it contains will separate themselves from the red globules, and make their way through the coats of the vessels, and this serum being thus extravasated, diffuses itself here and there, and soaks into the texture of the lips and adjacent parts of *wounds*, however compact and tense they might be before. When, therefore, we compress parts thus relaxed and softened, it is not surprising that they should make small resistance to the impressions of fingers, but on the contrary yield to them, and retain them, till they have time to resume their natural state. These parts also become transparent, because being before naturally white, they, in consequence of the division, or separation of their elementary fibres, afford a more easy access to the rays of light, which act upon them. In a word, such parts are, almost, incapable of sensation or pain; for the extremities of the nerves, distributed through them, are also relaxed by the surrounding serum, which produces an extravasation of the animal spirits from their proper receptacles, and, consequently,



frequently, prevents their return to the brain, on which, however, the sensation of the parts entirely depends.

## SECTION VI.

**I**N persons, whose blood is naturally hot and acrimonious, *wounds* are accompanied with erysipelas, that is, the tumor of their lips is less elevated, and more superficial; but, at the same time, more red, inflamed, painful, hot, and very often there are formed on it, small vesicles, which contain an highly acrid serum. The peculiar quality of the blood of such persons, is the only cause of all these symptoms; for it is certain, that the more the principles of the blood are exalted and agitated, the less that fluid is disposed to lose its fluidity. Hence it follows, that happening to meet with an obstacle about the lips of a *wound*, it must more easily convey itself, by means of the collateral vessels, into the venous trunks, and by that means be accumulated in a smaller quantity, in the vascular ramifications distributed round the *wound*; and consequently the tumor formed by it will be of a smaller bulk. It is also certain, that such a blood as we here speak of, must ferment with more force, than one of a more unctuous and balsamic

balsamic nature: Thus the heat perceived in *wounds*, being, as we have before shewn, proportioned to the degree of the blood's fermentation, it necessarily follows, that at the time the tumor is most superficial, it is also accompanied with the greatest heat, and pain; for the more violent the fermentation of the blood is, with the greater force the saline and acrid particles it contains, are forced against the sides of the vessels, by which means a more intense irritation is excited. In a word, the serous portion of such blood impregnated with saline particles, and such as are much disposed to fermentation, happening to discharge itself upon the *corpus mucosum*, and gradually accumulating itself, will insensibly, by its bulk, fermentative motion, and rarefaction, separate the epidermis from the skin, and, in various parts, elevate it into small vesicles, called *phlyctenes*, which as we have before observed, sometimes happen in *wounds*.

## SECTION VII.

**I**N *wounds*, made by contusion, we observe all the same symptoms with those accompanying *wounds* produced by incision; for every thing capable of preventing the motion of the

blood, and lymph in the lips of a *wound*, such as exsiccation and the collision of the vessels made by a contusion, must produce all the symptoms we have specified.

## SECTION VIII.

**I**N *wounds* accompanied with intense pain, the patients are afflicted with watchings for the following reason : It is sufficiently certain, that watching depends only on the tension of the vessels of the medullary substance of the brain, and of the nerves distributed from it, to the several organs of sensation and motion, and that this tension on the other hand, only depends on the continual motion of the spirits ; so that we may easily conceive, that every thing capable of agitating and moving the animal spirits, contained in the medullary substance of the brain, and of determining them to flow through all the windings of it, and into the nerves of the body, will produce this tension, so necessary to keep the senses, whether external or internal, in continual exercise. Now a violent pain produces this effect, by the reflux of the animal spirits which it occasions, from the parts affected, to the brain.

## SECTION IX.

**T**HIS reflux of the animal spirits may serve to explain why in *wounds* accompanied with intense pain, all the parts are more sensible than usual. It is certain, that as the sensibility of the parts depends only on their tension, the greater this tension is, the greater the sensibility must also be: It is equally manifest, that the tension of the parts is so much the greater, the more copiously the animal spirits are conveyed into the nerves, distributed through them. Now the reflux of the animal spirits from an affected part to the brain, where they are filtrated, determines them to flow more copiously into other parts. This cannot be called into question; for it is evident, that the animal spirits cannot flow back, without repelling to their source, all the other spirits they meet in their way, and forcing them to detach themselves, in order to augment the quantity of those conveyed to other parts, which cannot happen, without, at the same time, accelerating the velocity of their motion.

## SECTION X.

**T**HIS greater abundance of animal spirits conveyed to the parts of intensely painful *wounds*, is the cause which excites a fever in them; for, as we have before shewn, a fever consists only in the increase of the fermentation of the blood, and nothing is more proper to augment this fermentation, than a larger quantity of animal spirits conveyed into the blood, or lymph, by means of the veins or lymphatic vessels, which receive them from the extremities of the parts, when they are arrived at them.

## SECTION XI.

**I**N *wounds*, the pain is sometimes so intense as to occasion a delirium, which is produced by the uncommon agitation of the spirits, which being briskly repelled to the brain, are irregularly carried here and there, and revive at the same time, the impressions, which a variety of different objects have imprinted on the different parts of that organ, whence there follows a confusion of vague and ill-arranged ideas, which, presenting themselves all together to the mind, lay a foundation for the false and absurd judgment it forms.

## SECTION

SECTION XII.

**C**ONVULSIVE motions whether of the whole body, or of some particular parts of it, form another symptom frequently brought on by the violent pain attending wounds. This is by no means surprising, since we have before shewn, that one of the effects of pain is, to produce an irregular motion of the spirits, and since we are equally certain, that convulsive motions are nothing else, but involuntary contractions of different muscles, produced by a precipitate and irregular motion of the animal spirits. And as wounds of the nerves and tendons are accompanied with much more acute and intense pains than those of the muscular parts, it is easy to conceive why a fever, delirium, and convulsive motions, happen more frequently in the former than in the latter.

SECTION XIII.

**I**N wounds the pain is some times so intense, that the patient falls into a syncope, or deliquium. In order to account for this, we must observe, that a syncope, or deliquium, pro-



proceeds from a difficult flux of the animal spirits into the parts, or even a total cessation of this flux, which depends some times, on the too weak contraction of the heart, or perhaps, a total cessation of its contraction. This being granted, we can easily shew, the mechanism by which pain arrived to a certain degree may produce a syncope; for at this time, the spirits being copiously determined to the parts, produce a strong contraction of the nervous fibres, which compose them. This strong contraction expresses the blood and lymph, from the extremities of their respective vessels, and speedily forces them into the veins, by which means the velocity and quantity of the blood returning to the right auricle, and ventricle of the heart, are considerably augmented, so that the right auricle and ventricle being overcharged by the quantity of the blood, are preternaturally distended, and remain in that situation, without being able to contract themselves, and furnish the left ventricle with the blood necessary to be distributed to the brain, and all the other parts of the body, by which means the brain receiving only very little blood, the secretion of the animal spirits is soon diminished, or totally ceases; and when the animal spirits are  
only



only imperfectly distributed to the parts, these when deprived of a fluid, in which all their strength consisted, become languid and relaxed, in consequence of which, the patient falls into a deliquium.

#### SECTION XIV.

**I**T some times happens, that this disposition, to weakness, occasioned by the intense pain of a *wound*, excites a vomiting of the matter contained in the stomach; for as we have shewn in the preceding article; the stomach, on such occasions, receives fewer animal spirits than at other times, and consequently the ferment necessary to digestion being less active, the aliments, or their remains, are neither dissolved, nor digested, but form an inspissated liquor, whose gross and saline parts acting on the extremely sensible coats of the stomach, excite a sense of anxiety, a pain in the region of the stomach, and a genuine cardialgia. By this means the spirits are forcibly repelled from the stomach to the brain, whence, in consequence of the sympathetic motions observed between the different parts of the body, they are conveyed into the nerves of the diaphragm, and of the abdominal muscles; and

these

these muscles contracting themselves violently, and pressing the stomach on all hands, force the liquors contained in it to discharge themselves, wherever they can find a passage. Now, as the stomach has a superior and inferior orifice, the liquors contained in it will be evacuated by both, only with this difference, that the pylorus, or inferior orifice, having a smaller diameter than the superior, the greatest part of the liquors, contained in the stomach, will be forced into the œsophagus, and evacuated by the mouth, which is what we call *vomiting*.

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### CHAP. III.

*A continuation of the explication of the symptoms of wounds.*

#### SECTION XV.

**A**S all the symptoms hitherto mentioned, such as the fever, the delirium, the convulsive motions, the heat, redness, and painful pulsation of the wounded parts, are only produced by the preternatural fermentative motion, into which the blood is thrown by a wound,

*wound*, it is easy to explain why all the symptoms are augmented some days after the *wound* is inflicted. This is always a consequence of the hemorrhage of blood from the vessels in the lips of the *wound*, and of its continuation, or coagulation in the different superficial ramifications formed by these vessels; for the fermentative parts of the blood happening to adhere to each other, in consequence of the dissipation of its most volatile portion, form larger molecules, and consequently, ferment so much the more strongly. Now the more violent the fermentation of the blood is, the more it is rarified, and the greater space it possesses in the vessels, -so that by distending and lacerating their elementary fibres, it irritates and agitates the nervous filaments distributed to the lips of the *wound*, and by that means, occasions a more impetuous reflux of spirits to the brain, in consequence of which, a more intense pain is excited, and all the before mentioned symptoms produced.

## SECTION XVI.

**T**HE blood lodged in a wound, after some days acquires a thicker consistence than it had before, loses its red colour, and is changed

changed into a lymphatic liquor of a fordid white colour, called *pus*. This change is also produced by the fermentative motion of the blood, stopped in the lips of the wound; for the volatile parts, whether saline or sulphureous, being dissipated by this motion, the others are formed into a thick liquor. Besides, the violence of this motion attenuates, breaks, dissolves, and dissipates the globular part of the blood, from which it receives its red colour. Thus there remains nothing but a lymphatic liquor, whose parts adhering more strongly, in consequence of the dissipation of the serous portion, make it appear under the form of an inspissated liquor, which is no longer grumous as the blood was, but of an equal consistence, and whitish colour; and this is true *pus*.

## SECTION XVII.

**A**S the blood retained in the extremities of vessels, in the lips of wounds, cannot be converted into *pus*, till the fermentative motion, which produces this change, strongly applies, to the sides of the vessels, many saline particles, which it has disengaged from the matter in which they were sheathed up; so these saline particles, like so many wedges or files,

files, will destroy and corrode the texture of the vessels; so that, according to our definition of an ulcer, every wound, whose inflam'd edges come to a suppuration, is chang'd into an ulcer.

## SECTION XVIII.

**W**OUNDS, by contusion, frequently degenerate into a mortification, by the *Greeks* called *gangrene*, or *sphacelus*, which only differ in degree from each other; since a *gangrene* is the first, and a *sphacelus* the last stage of a mortification. Some reflections on what happens in wounds, by contusion, will discover why they terminate in this manner: The vessels and nerves then distributed to any part, being bruis'd and shatter'd, by any contusing instrument, the usual course of the animal spirits, in the nerves of these vessels, and their mixture with the blood they contain, are interrupted. The natural fermentation of the blood, which is only supported by this continual afflux of spirits, and which is so necessary for procuring to it that peculiar disposition, which renders it proper for its several functions, so long as it circulates freely, ceases entirely, and is changed into a corruptive motion, which trans-

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forms the blood into a thick sanies, quite different from pus. Besides, the most fixed saline particles of this corrupted blood, being destitute of the other saline, more volatile, and sulphureous parts, which sheathed them up, and weakened their action in a natural state, become fit to corrode the vessels, and the substance of the adjacent parts; tho' not in the same manner as corrosive liquors would do, but like a cautery, which burns and dries, making the most subtle parts evaporate, in proportion, as it destroys the solids, and only leaving behind it the most gross, earthy, and sulphureous parts. From what has been said, we comprehend how the corrupted part of the blood remaining in a wound, by contusion, as it were burns the vessels, and the texture of the lips of the wound. As this species of burning, forms an incredible number of small holes in the parts, on which it acts, it necessarily follows, that the rays of light being absorbed by them, as into so many vacuities, are not reflected, in consequence of which, the part wounded appears black. Besides, 'tis easy to conceive, that parts thus dried lose their natural elasticity, and become unfit for any of their usual functions, that is to say, they are no longer nourished, become insensible, and



and are mortified, or nearly so; all which signs denote the presence of a gangrene or sphacelus.

## SECTION XIX.

**W**OUNDS, by contusion, are not the only *wounds* subject to terminate in a gangrene, since the same happens to all other *wounds*, made in whatever manner, when they are accompanied with a violent inflammation, which, at that time, produces on the nerves the same effect, as would be produc'd by a contusion; for the blood which powerfully distends the vessels, by that means compresses the nerves intermixed with them. Hence the course of the animal spirits into these nerves is interrupted, and, consequently, the loss of sensation, and a destruction of the other functions of the parts, to which they are distributed, brought on. Hence, also, arises that putrefaction of the blood, which remains in the lips of *wounds*, and its change into a thick and corrosive humour, which, as it were, cauterises the substance of the parts, and brings on a total mortification.

## SECTION XX.

**T**IS ordinary to observe a diarrhæa supervene, when *wounds* suppurate, or begin to do so, and this diarrhæa is produced by the resorption of the saline, and acrid particles of the pus, into the blood-vessels: These particles, when mixed with the blood, dissolve and colliquate it, or reduce it to a serous state, more or less saline, according to the greater or smaller acrimony of the pus, form'd in the wound. The blood thus dissolved, is conveyed into the intestines, the organs naturally destined for the filtration of such a saline, and acrid matter, and by this means, the intestinal fibres are irritated more briskly, and forced to contract themselves more strongly, and frequently, in order to expel the excrements, and with them the serous saline matter they have secreted, whence a diarrhæa ensues.

THIS diarrhæa is sometimes bilious; for the pus resorbed into the vessels, may not only dissolve the lymphatic part of the blood, but also the bile mixed with it, and communicate to this bile a greater degree of acrimony: This bile, then becoming more fluid and stimulating, secretes itself in a larger quantity, and flowing  
more

more copiously into the duodenum, by its irritating quality, augments the peristaltic motion of the intestines; in consequence of which, this bile is more speedily determined towards the rectum, where mixing with the serous matter, and communicating a yellow colour to it, both are expelled together; and this is what is called a bilious diarrhœa.

## SECTION XXI.

**I**N wounds accompanied with intense pain, such as those of the tendons, nerves, and joints, whether made by contusion or incision, the patient perceives, all over his body, horrors and shiverings, which are sometimes succeeded by a violent and acute fever, accompanied with a delirium, insatiable thirst, vomiting, and convulsive motions. All these symptoms are so many effects of the melancholy and sadness, which, seizing a patient in great pain, retard the course of the animal spirits to the stomach; by this means, the aliments are ill digested and changed into an acid, or saline chyle, which, mixing with the blood, inspissates it, and diminishes its natural fermentative motion. Hence also arises the coldness of the external parts of the body, every time the patient takes

aliments, since heat depends entirely on the fermentation of the blood.

BESIDES, these acid, or saline-acid particles of the chyle, which produce the inspissation of the blood, by embarrassing its sulphureous parts, in which they have some of their points fixed, float in the serous part of the same blood with their opposite points, which are at liberty. Hence we perceive, that they cannot be carried off by the current of the circulation, without wounding and irritating the nervous fibres they act upon, and thus produce an uneasy sense of puncture. Hence there will succeed as many reflexes of the animal spirits to the brain, and these spirits will be determined in greater quantities, but irregularly to other parts, where they will produce equally irregular contractions in different muscles, and, as it were, a trembling, or shivering of the parts.

BESIDES, these acid, or saline particles, engaged in the sulphureous parts of the blood, and floating in its serous portion, after many repeated circulations, meet with the saline-acrid parts, which had been mixed with the blood a long time before. Now these principles cannot meet without fermenting, and this fermentation is so much the stronger, because they  
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are of a larger bulk than the fermentative particles of the blood naturally are; so that, of course, a fever must soon succeed the horrors and shiverings, which accompany painful wounds.

## SECTION XXII.

**I**N the *wounds* we have been describing, the liver is sometimes inflam'd, and we perceive all the signs of this inflammation, as pain and tension of the right hypocondrium, a burning fever, a delirium, an insatiable thirst, and even an abscess in the part. All these symptoms happen, because the acrid and ill-conditioned chyle, inspissates not only the blood, but also all the recrementitious humours, especially, such as are naturally gross and viscid, as the bile is. Hence there ensues an obstruction of the biliary duct, whose ramifications being distended, compress the adjacent blood-vessels, and, by that means, create a great resistance to the blood, which, acting continually, at last breaks the vessels, which refuses its entrance, and discharging itself into the whole substance of the liver, by its continuance, becomes hot, and forms an inflammatory tumor in that organ.

## CHAP. IV.

*Of the diagnostics of wounds.*

## SECTION I.

**T**H O' 'tis easy to discover the part of the skin, which is wounded, yet 'tis very difficult, especially in *wounds* made by pointed instruments, or fire-arms, to determine the largeness of the *wound*, and the parts injured by it; for the deeper a *wound*, made by the thrust of a sword or a musket-bullet, is, the more difficult it is to ascertain the largeness of the wound, and the whole of the parts affected. In a word, surgeons, are at first, often at a loss to determine, whether a wound has penetrated into some cavity of the body, as the abdomen, the breast, or head; and whether the organs included in these, are wounded or not: And yet a knowledge of each of these is necessary, in order to judge of the nature, largeness, and danger of the wound. The first thing, then, the surgeon ought to do, when he is called to  
attend



attend a wounded patient, is to examine in what part the *wound* is, and whether it is deep; since, for example, if the *wound* penetrates into the cavity of the breast, it is a sign that some of the parts included in it, either the heart, or the lungs, are wounded, and the same holds true of the other cavities of the body. Secondly, we must carefully observe, what functions are injured, after the reception of the *wound*; for when a part loses its action, in consequence of a *wound*, there is a great probability, that this very part has suffered some injury. When, for instance, in a *wound* of the head, we observe a lethargy, or delirium, we have reason to think, that the brain is affected, if the *wound* is deep; or, that its substance is compressed, either by a depressed portion of the cranium, or by extravasated blood, and the like holds true, with respect to *wounds* of other parts. However, as the functions of a part may be disorder'd, when the part itself is not in the least injured, we must by a careful examination of the situation of the *wound*, assure ourselves, whether the parts are affected originally and of themselves, or only by sympathy. Thus, for instance, deliriums and convulsive motions sometimes happen in *wounds* of the tendons, tho'

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at the same time, the brain is not in the least wounded; but this happens in consequence of the communication of nerves.

The qualities of the substances discharged from the orifices of *wounds*, also enable us to form a judgment of the extent of such *wounds*, and the various degrees of danger attending them. Thus if in a *wound* of the breast, the patient spits blood, 'tis a sign, that the lungs are wounded; in like manner, if in a *wound* of the abdomen, the excrements are discharged from the wound, we may be certain that the large intestines are opened. In the same manner, when the urine is discharged from a *wound* of the abdomen, we are certain, that the bladder is wounded. If the blood discharged from a *wound*, is of a florid red colour, and flows out by alternate starts as it were, it is a sign, that some artery is opened, whereas, if it is of a deep obscure red, and flows with an equable motion, it denotes, that only a vein is wounded.

The particular symptoms, and especially the species of pain, which accompany *wounds*, also indicate the wounded part; for an acute, and as it were, pungent pain; denotes, that nerves, or tendons are affected; whereas, a  
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dull pain indicates, that only the muscular parts are affected. As for the various changes which happen in wounds, we may know the danger, or advantage of them, by the following signs. When a *wound* becomes still more and more painful and hot, it is a sign, that its lips are ready to suppurate; for this heat and pain are produced by no other cause, than the fermentative corruption of the blood, lodged in the vessels, distributed through the lips of the *wound*. But if the pain augments to such a degree, as to become as intense as that accompanying burns, it is a sign, that the fermentation of the blood remaining in the *wound*, is arrived at its highest degree, and has so disengaged the saline particles, that the vessels are corroded, and, as it were, burned by them; in consequence of which, they become incapable of performing their functions, and are seized with a mortification, which is a sign, that the lips of the wound will soon be affected with a gangrene; of the presence of which we may be still more certain, when the lips of the *wound* become cold; for this symptom cannot happen, till the fermentation of the blood is absolutely suppressed, and the afflux of the animal

animal spirits totally interrupted; and in this the mortification of the parts consists.

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## CHAP. V.

### *Of the prognostics of wounds.*

**T**IS not sufficient that a physician or surgeon, should, after having examined the nature and extent of a *wound*, apply proper remedies to it; but, 'tis also necessary, they should be able to ascertain the manner in which it will terminate, and predict, whether it will prove mortal, or is susceptible of a cure; for an exact knowledge of these things, not only enables them to take proper measures for the recovery of the patient, but is also absolutely necessary, in order to make faithful reports before courts of judicature, that the judges may neither punish the innocent, nor acquit the guilty.

IN order to render my sentiments, on this subject, the more distinct and intelligible, I shall first give the definitions of a mortal, and of a curable *wound*. A *wound*, then, is said to be simply, and in its own nature, mortal, when the patient generally dies of it in a few hours,

hours, or days, whatever measures are taken for his preservation, however laudable a state his blood is in, and however proper a regimen he observes, I say *generally* ; for, because, there are certain *wounds* of which some patients have been unexpectedly cured, yet this does not hinder us from pronouncing such *wounds* mortal ; since it is sufficient for our purpose, that they most generally prove so, and that, comparatively speaking, few are cured of them. On the contrary, we say a *wound* is curable, when it *may be* consolidated by the use of proper remedies, provided the blood is not vitiated, and the patient observes a proper regimen. I say, *may be*, because, tho' the bad quality of the patient's humours, and the errors he commits, with respect to the six non-naturals, often render *wounds* mortal, which are not of their own nature dangerous, and might be otherwise easily cured, yet this is not a reason why we should look upon them as really mortal.

## SECTION I.

THESE principles being established: As the afflux of the animal spirits to all the parts, is absolutely necessary to the support of life, it is evident, that all *wounds*, which hinder

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and prevent this afflux, must certainly prove mortal; and that, consequently, all considerable *wounds*, of the brain and spinal marrow, ought to be ranked among this class; for nothing is more proper to intercept the distribution of the spirits, than the compression such *wounds* occasion on the origin of the nerves, or the inflammation and putrefaction they there produce.

## SECTION II.

**A**S the continual circulation of the blood thro' all the parts, is no less necessary to life, than the distribution of the spirits, all wounds capable of hindering this circulation, must also prove mortal; such are all *wounds* of the heart, whether large, or small; for in *wounds* of this organ, it happens, either that the subsequent inflammation hinders the heart to contract itself, and propel the blood into all the parts, or, that the blood discharging itself too copiously from the *wound*, is no longer conveyed thro' the arteries.

## SECTION III.

**C**ONSIDERABLE *wounds* of the lungs, in which the large vessels are wounded, as well as *wounds* of the diaphragm, tho' small, ought to be looked upon as essentially mortal; because



because both these species of wounds hinder the free access of the air into the lungs; the former by the extravasation of the blood made into the breast, which compressing the external surface of the lungs, does not permit their dilatation; and the latter, by the violent pain which accompanies them, and by the inflammation, which happening in the diaphragm, hinders it from contracting itself, in order to enlarge the cavity of the breast. Now, 'tis certain, that all the animal functions depend on the free access of the air into the lungs, since tis by this means, that the blood retains its fluidity, and that degree of fermentation, which is necessary to its circulation.

#### SECTION IV.

**A**LL wounds made in large vessels, such as the aorta, the vena cava, the pulmonary artery or vein, the axillary, iliac, or crural arteries, or veins, and the vena portæ, are of themselves mortal, on account of the enormous hemorrhages with which they are attended, their lips remaining always open, and not being able to come into contact, both on account of the great quantity of blood continually conveyed to them, and because the ex-

extremities of the divided vessels, in consequence of their natural elasticity, shrink from each other, which favours the hemorrhage.

## SECTION V.

AS the reparation both of the solids and fluids, without which life cannot long subsist, can only be obtained by means of aliments, which for that purpose must pass thro' the œsophagus, be retained and dissolved in the stomach, and thence pass into the intestines, in order to be conveyed into the lacteals, and mixed with the mass of blood, it is sufficiently obvious, that all considerable *wounds*, which penetrate into the cavities of the œsophagus, stomach, or intestines, must prove mortal. The wounds of the œsophagus, will either by the subsequent inflammation hinder deglutition, or, by the large aperture of the *wound*, afford a passage for the aliments, and thus prevent their descent into the stomach. *Wounds* of the stomach prove mortal, in consequence of the extravasation of the aliments, which ought to have been retained in it, and dissolved by the action of the digestive ferment. *Wounds* of the intestines prove mortal, in consequence of the evacuation of the chyle, through the orifice of the *wound*,  
before

before it could enter the lacteals. Both these species of *wounds* also prove mortal, in consequence of the inflammation and gangrene happening to the parts on which the extravasated aliments, or excrements, become acrid and corrosive, after their extravasation into the cavity of the abdomen are deposited.

## SECTION VI.

**A**LL considerable *wounds* of the liver, terminate in the death of the patient; and it can hardly be otherwise, considering the inflammation which happens in this organ, and which intercepting the passage of the blood from the ramifications of the vena portæ, into those of the vena cava, occasions the blood, which ought to return from the stomach, intestines, and spleen, to remain in the capillary extremities of the vessels of these viscera, where it soon produces a mortal inflammation; and besides, 'tis certain, that the liver is an organ, whose vessels are very considerable. Now we may easily conceive, that such vessels, resembling, in some measure, the vena cava, and the vena portæ, being wounded, the hemorrhage must be so copious as not to be stopt, except by means of ligature; but this cannot be practised in wounds.

of the liver. Besides, the impossibility of evacuating, from the cavity of the abdomen, the blood, and the pus (if any is form'd) discharged in *wounds*, of the concave part of the liver, is another cause, which renders such *wounds* incurable; for this blood and pus irritating and corroding the parts contain'd in the abdomen, produce, in them, inflammations and abscesses, which always prove mortal.

## SECTION VII.

**W**E also reckon among the number of dangerous and mortal wounds, those which penetrate into the urinary bladder; for besides that the continual motion of this membranous sack, which is sometimes contracted, and at others distended, hinders the re-union of the lips of *wounds* made in it, the continual discharge of the urine into the cavity of the abdomen, does by its acrimony, acquired in consequence of its stagnation, soon produce inflammations of the intestines, which circumstance, also, renders *wounds* of this kind incurable. Add to this, the inflammation of the bladder itself, which spreading, by means of communication, as far as the arteries, produces a suppression of urine, so much the more dangerous, because

because these parts have a great tendency to become gangrenous, when they are once inflamed.

## SECTION VIII.

**A**LL *wounds*, even the most slight, which are naturally susceptible of a cure, become inevitably mortal, when they are inflicted with poisoned or envenom'd instruments; for all poisons destroy the substance of the solid parts, or entirely alter the quality of the blood, and never fail, in one way or other, to produce certain death.

## SECTION IX.

**A**S the cure of *wounds*, as well as of all other diseases, is, in reality, the work of nature; and as nature cannot perform this cure, except, when the blood is laudable, and in a good condition, 'tis evident, that *wounds* apparently of no great importance, may become fatal, in consequence of the bad quality of the blood, whether natural or acquir'd. For this reason, it often happens, that slight *wounds* produce very terrible consequences, in some old and young persons: In the former, because their blood being exhausted by the debauches of  
their

their former years, is become acrid and corrosive by the disengagements of many fermentative salts; and, in the latter, because the pains on which the most violent symptoms of *wounds* depend, become more acute and intense, by the impatience with which they bear them.

## SECTION X.

**W**OUNDS that are considerable, but yet susceptible of a cure, may become mortal by bad management, proceeding either from ignorance or negligence; of this kind, are *wounds* of the joints and tendons, which require the greatest care of the surgeon to prevent, or cure all the terrible symptoms, which frequently attend them.

## SECTION XI.

**T**HE improper and preposterous use of the six non-naturals, is capable of producing dangerous symptoms in *wounds*; for if a very wounded patient goes to excess in eating or drinking, if he indulges himself in violent passions, such as anger, if he is seized with terror, if he is immoderate in the use of venery, and, in a word, if he transgresses in the use of the six non-naturals, his *wound* may become mortal,



tal, however curable it might have been of itself.

WHAT we have hitherto said, concerning mortal *wounds*, is sufficient to enable the physician, or surgeon, to make just reports before courts of judicature; so that we shall now proceed to lay down the other prognostics of *wounds*, beginning with a general explication of what relates to such as are mortal.

## SECTION I.

ALL *wounds* of the internal parts then, are much more dangerous than those of the external parts; because, in the former, the hemorrhage cannot be stopp'd by ligature.

## SECTION II.

THE intense pain, the watchings, the deliriums, and the convulsive motions, which always attend *wounds*, inflicted in highly sensible parts, being very terrible symptoms, render *wounds*, in, or near the joints, much more dangerous than those of the muscular parts, because the former never fail to affect nerves, tendons, or ligaments; all of which

are, in consequence of their natural tension, highly sensible.

### SECTION III.

**W**OUNDS, made by contusion, are very dangerous; for, as we have shewn in the third chapter, when treating of their symptoms, they easily degenerate into a gangrene and sphacelus.

### SECTION IV.

**I**N *wounds*, made by puncture, or incision, the animal spirits which ooze from the extremities of the divided nerves, and which always continue to flow into the cut vessels, correct the acrimony of the blood, which is to be converted into pus, and hinder the latter from corroding the texture of the wounded, and adjacent parts; for which reason these *wounds* are far less dangerous, than such as are made by contusion.

### SECTION V.

**A**LL *wounds*, whose lips and adjacent parts are highly tumid, tense, and inflam'd, are very dangerous, because the great distension of the vessels, compresses the nerves, and, by that

that means, intercepts the course of the animal spirits, and renders the inflam'd parts subject to gangrene and sphacelus.

## SECTION VI.

**W**OUNDS made by cutting instruments, are more difficult to cure, when the incision is transverse, with respect to the direction of the fibres, than when it is made in the same direction. The reason of this is, because the natural spring and elasticity of the fibres, cut in a transverse direction, separate the cut extremities from each other, and thus oppose their re-union, which does not happen in *wounds*, which only separate the fibres from each other, according to their length, without breaking their continuity.

## SECTION VII.

**L**ARGE and deep *wounds* are much more dangerous, than such as are small and superficial, and are also less speedily, and easily cured, not only because in the former a greater number of vessels being open'd, the hemorrhage must be more violent, and the inflammation more considerable, two sufficiently terrible symptoms;

symptoms; but also, because the lips of large *wounds* are more separated from each other, and more difficultly brought into contact and consolidated.

## SECTION VIII.

**W**OUNDS, in which a considerable portion of the flesh or skin is removed, become, for that very reason, highly dangerous, on account of the violent inflammation, which speedily happens in them, by means of the immediate contact of the air, which coagulates the blood in the whole extent of the *wound*, and introduces into it many fermentative particles, with which the air is always impregnated.

## SECTION IX.

**T**HE larger and more inflam'd *wounds* are, the more dangerous they must of course be; for 'tis certain, that when an inflammation is considerable, the suppuration, succeeding it, must be proportionably the more copious, and last the longer time; a circumstance which exhausts the patient, and brings on an atrophy or marasmus, which in *wounds* are two formidable

able symptoms. Besides, the continual resorption of the fermentative parts of the pus, into the mass of blood, produces a slow fever, which gradually and insensibly cuts off the patient.

## SECTION X.

**A**NOTHER reason why these *wounds* are so dangerous, is the great dissipation of spirits, occasioned by the vast number of nerves whose extremities are cut, in consequence of which the patient's strength is greatly impaired.

## SECTION XI.

**S**MALL *wounds* are no less dangerous, when accompanied with a violent inflammation, since this is a sign that the blood is extremely acrid, or greatly disposed to coagulate; in both which cases, the obstructed vessels, adjacent to the *wound*, suffer an enormous distension, which, when excessively great, never fails to produce a gangrene.

## SECTION XII.

**T**IS a bad sign, when the surface of an inflam'd *wound* appears livid or blackish, since this symptom indicates, that a large quantity

tity of extravasated or grumous blood is lodged in the vessels; which, by its bulk, distends them too much, and, by that means, prevents the free afflux of the animal spirits, and threatens an approaching mortification.

### SECTION XIII.

**A** SENSE of cold happening in an inflam'd *wound*, always denotes a gangrene; because it is a sure sign, that the course of the spirits, and the fermentative motion of the blood, have entirely ceased in the wounded part.

### SECTION XIV.

**T** HIS always dangerous, when an inflam'd *wound* becomes pale, either before, or during the suppuration; especially, if it happens unexpectedly; for this symptom is a certain proof, either, that the serum, too copiously discharg'd, relaxes the texture of the lips of the *wound*, and adjacent parts; in which case, becoming acrid by its continuance, it insensibly destroys the parts, and resolves them into their elementary fibres; in which case the parts rendered incapable of their usual functions, fall into a *gangrene*; or the paleness which happens in inflam'd *wounds*, indicates, that the blood lodg'd in the lips of the *wound*, is resorb-



ed into the vessels; in which case, not only this stagnant blood, but also the rest of the mass must be dissolved and colliquated; in consequence of which, it becomes incapable of supporting the animal functions, for any considerable time. Or, lastly, an inflam'd *wound* only becomes pale, because the heart and arteries are so weakened, that they are no longer able to propel to the wounded part, as much blood as was usually conveyed to it, which is a symptom no less dangerous.

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## CH A P. VI.

*A continuation of the explication of the prognostics of wounds.*

### SECTION XV.

**W**HEN the lips of a *wound* become dry, about the time of suppuration, tis a sign, that the great heat and acrimony of the blood have dissipated the aqueous parts, of that remaining in the lips of the *wound*, and that this blood being become more thick, and as it were dry, will not easily fall into fermentation, on account of the difficulty its saline

parts have to meet each other; so that this symptom is a sign, that the *wound* will not, without great difficulty, arrive at suppuration; and that, when the suppuration happens, it will be accompanied with very terrible symptoms, in consequence of the violent dilaceration of the nervous fibres of the vessels, by means of the excessive fermentation, produced by the saline parts, which are more active, because they are larger, and less dissolved.

## SECTION XVI.

**D**RYNESS happening in *wounds*, when they are about to suppurate, is always a bad prognostic; since it indicates, that the strength of the patient is so far exhausted, that the motion of the heart is become too languid to propel the blood, as usually, to the vessels of the *wound*, or, at least, too weak to force its return from them; for which reason the blood remains, and becomes grumous in them. In this case we may expect a new phlegmonous inflammation, accompanied with pain, and all the other symptoms, which generally precede a suppuration. 'Tis therefore obvious, that a wounded patient, weakened by what he has suffered before, is still in greater danger, when he

he is attacked by fresh symptoms as terrible as the former.

## SECTION XVII.

**W**E have reason to form a very bad prognostic, when in the beginning of the suppuration we observe, that the lips of a *wound* are corroded unequally, and, as it were, denticulated; since, in such cases, the corrosive quality of the blood, which is in the lips of the *wound*, and is the only cause of these symptoms, threatens the patient with violent pains, and fresh and obstinate inflammations, which will continually succeed each other.

## SECTION XVIII.

**T**IS a very bad sign, when the lips of a suppurating *wound*, instead of discharging a laudable, white, equal, and sufficiently fluid, permit a serous humour to ooze out, which denotes, that the mass of blood is dissolved; in consequence of which, too great a quantity of the nutritive juice and animal spirits, is discharged into the *wound*, which produces extenuation and want of strength in the patient. Besides this serum copiously discharged from

a suppurating *wound*, demonstrates, that the blood is impregnated with acrid and corrosive salts, highly proper to excite intense pains, and, by that means, induce new inflammations, productive of very terrible consequences.

## SECTION XIX.

**I**F the pus discharged from a *wound* is of a greenish colour, we have no reason to suspect the corrosive quality of the blood, and may consequently form a bad prognostic; for the patient is in danger of an inflammation and gangrene, not only in the *wound*, but also in the internal parts and viscera.

## SECTION XX.

**W**OUNDS, the pus of which tinges silver or iron probes, with a yellow or blackish colour, lay a foundation for a bad prognostic; for this change of colour indicates, that the pus is become so corrosive as to dissolve the external surface of these instruments, and disorder the situation of its component parts. Now such a pus cannot fail to destroy the lips of the *wound*, and excite very terrible symptoms.

## SECTION

## SECTION XXI.

**W**HEN a *wound* suppurating well, suddenly ceases to suppurate, and its lips become flaccid, dry, and parched, 'tis a sign, that the blood in the lips of the *wound*, and which ought to be converted into pus, or the pus itself already formed, are resorbed by the veins into the mass of blood, which they have either dissolved or coagulated, according as their salts, in disengaging themselves, have acquired the nature, either of saline acrid, or saline acid salts, in both which cases, this sign is always mortal; for if the blood is dissolved, and has lost its natural form, all the functions must necessarily be soon destroyed. If, on the other hand, it is coagulated, and its consistency become too thick, it will block up its own passage into the different parts, and be forc'd to flow back into the vessels of the adjacent parts, where, by its bulk, it will produce various inflammatory tumours, which are always highly dangerous, especially, when they happen in the viscera or joints, rather than in the muscular parts, as is certain from the prognostics of the different species of inflammatory tumors.

## SECTION

## SECTION XXII.

**I**N large *wounds*, all other things being equal, the lips must be considerably inflated and tumified, by the difficulty the blood finds to circulate thro' an infinite number of broken or corroded vessels, so that the blood remains in them, distends them, and produces a large tumour: Hence 'tis obvious, that the want of a tumor, in the lips of a large *wound*, is a dangerous sign; since it indicates, that the vessels are empty of blood, or, at least, contain but little; or, that the strength of the heart is so languid, that it cannot propel the humours into these parts.

## SECTION XXIII.

**A**S the nutrition, warmth, and generally all the functions of a part, most frequently depend upon the continual afflux of the blood thro' the large arteries of that part; and, as when this afflux ceases, a gangrene and sphacelus soon succeed, and leave no other resource but amputation, so 'tis evident, that *wounds*, in which the large vessels, conveying  
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the blood to the parts, are wounded, ought to be looked upon as very dangerous.

## SECTION XXIV.

**A**S hard labour, watchings, fretting, and uneasiness, render the blood and all the humours more acrid, and consequently disposed to produce in *wounds*, considerable inflammations, intense pains, and a bad suppuration, 'tis obvious, that *wounds* are more dangerous in patients exhausted by hard labour, or fretting, than in persons of a sound constitution, and good habit of body. For this reason, the *wounds* of soldiers, towards the end of a siege or campaign, or when they are about to enter into their winter quarters, are much more troublesome than *wounds* received before the men are exhausted by hardships and fatigue.

## SECTION XXV.

**I**N winter, *wounds* are accompanied with much more terrible symptoms, than at any other season of the year; for the fermentative motion of the blood is less strong in this season, than in any of the rest, which renders the blood thicker, and more disposed to stop, and produce

duce a tumor in the lips of the *wound*. Besides, the slowness of the fermentative motion, and the too thick consistence of the blood, occasion a difficult suppuration; which, when it happens, is accompanied with intense pain, occasioned by the violence of the fermentation into which the blood then enters; for the fermentation is always the stronger, the thicker the blood is, as we have demonstrated in the 16th section.

## SECTION XXVI.

**W**OUNDS inflicted in summer are more dangerous, than those received in spring and autumn; because, in summer the blood ferments more strongly, and sustains a greater loss of its spirituous parts, than in the other two seasons; for which reason, the vessels of the lips of the *wound* being extremely distended, by this violent fermentation, the subsequent inflammation is very considerable, and intensely painful.

## SECTION XXVII.

**A**S the fermentative principles of the blood are neither too gross, nor too much attenuated in the spring, and consequently,

ly, as the fermentation they excite is more mild, 'tis evident, that when *wounds* come to a suppuration in this season, the blood, lodged in their lips, will ferment more gently, in consequence of which the tension, pain, and inflammation, will be less considerable. This is the reason why *wounds* received in the spring are less dangerous, than those inflicted in other seasons.

## SECTION XXVIII.

**I**N autumn, *wounds* are extremely dangerous, both on account of the acrimony of the blood, contracted by the loss of the spirituous parts, during the heat of the summer, which produces an extremely acrid pus; and on account of the inequality of the temperature of the air, which is sometimes hot, and sometimes cold, whence proceeds a similar inequality in the fermentative motion, which ought to produce the suppuration.

## SECTION XXIX.

**W**OUNDS, in which the nerves are only partially cut, are always attended with more terrible symptoms, than those in which

which they are totally divided; because, in the former, the dilaceration and irritation, which generally produce intense pain and convulsive motions, are far less considerable than in the latter.

## SECTION XXX.

**A**S *wounds*, complicated with a fracture of the bone, become difficult to be cured, on account of the particular dressing they require, 'tis certain, that *wounds* of this kind, are more dangerous, than such as are simple and only affect the muscular parts.

## SECTION XXXI.

**W**OUNDS, in which extraneous bodies are lodg'd, are more difficultly cured than others, because these bodies not only prevent the re-union of the lips of the *wound*; but also by their bulk and roughness, irritate the parts they touch, so as to produce contusions in them.

## SECTION

## SECTION XXXII.

**A** Burning fever is a terrible symptom in *wounds*, and lays a foundation for a bad prognostic ; for in a fever the blood circulates with great rapidity, and is conveyed into the parts, with greater force than usual. The obstructed vessels of the *wound*, will be greatly distended by this afflux of blood, and produce inflammatory tumors in the parts to which they are distributed. It will even happen, that the effort of the blood, daily augmenting, will break those vessels, in which it can hardly circulate, or it will make its way thro' their extremities, which had at first contracted themselves, and produce a very considerable hemorrhage, which will last as long as the fever : A circumstance of an highly dangerous nature, since it not only exhausts the patients strength, but also prevents the supuration.

ANOTHER inconvenience which attends a burning fever, when it happens in *wounds*, before they arrive at a suppuration, is the exaltation of the fermentative principles of the blood, which become acrid and disengaging themselves,

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afterwards serve to form a corrosive pus, which corrodes, destroys, and inflames all the parts on which it acts.

### SECTION XXXIII.

**I**N *wounds*, intense pains are no less dangerous than fevers; since the agitation of the animal spirits they produce in the brain, determining these spirits more copiously to other parts, soon excites a fever, by the new degree of fermentation, which it produces in the whole mass of blood.

### SECTION XXXIV.

**T**IS a very bad sign, when a wounded person is afflicted with watchings; for the violent fermentation into which the blood is thrown, in consequence of the continual afflux of the spirits into the vessels, occasioned by constant watchings, disengaging the salts of the humours, and rendering them more acrid, generally produces inflammatory tumors, pungent acute pains, and sometimes a gangrene.

### SECTION



## SECTION XXXV.

**V**OMITING, if continual, deprives the blood of that nourishment, which is absolutely necessary to obtund and sheath up its saline particles, which would otherwise disengage themselves, and become too acrid: A circumstance productive of many fatal consequences. Hence it is, that *wounds* accompanied with vomiting are very dangerous; but they are still more formidable, if the matter vomited, is bilious, porracious, and greenish; for this is a sign, that the blood abounding with an acrid bile, has totally vitiated the digestive ferment of the stomach, so that an inflammation of the stomach and intestines is to be dreaded.

## SECTION XXXVI.

**A** Diarrhæa happening in *wounds*, renders them highly dangerous; for it not only indicates, that the mass of blood is reduced to a kind of highly active brine, which renders the suppuration bad, and threatens a mortification in the *wound*; but also deprives the blood of that chyle, which is necessary both to restore the loss it continually sustains, in the various

organs of secretion, and to prevent the too great disengagement of its principles.

## SECTION XXXVII.

CONVULSIVE motions, accompanying *wounds*, lay a foundation for a bad prognostic; since they denote, that the blood, circulating in the lips of the *wound*, and adjacent parts, is become so highly acrid, as to irritate the nervous parts, and is, consequently, greatly disposed to produce violent inflammations, and even gangrenes. Besides, all convulsive motions, by shocking and irritating the wounded parts, increase and augment the pain, so as to render it intolerable. This effect is also promoted by the velocity of the bloods circulation in convulsions; for being strongly expressed from the texture of the parts in the veins, and thence conveyed to the heart, this organ must contract itself more frequently, and propel the blood with more force, and in greater quantities, into all the arteries, so that these, in the lips of the *wound*, will receive more blood, which will not only augment the pain and pulsation, but also the inflation and inflammation of the parts wounded.

## SECTION

SECTION XXXVIII.

**A**S in convulsions all the muscular parts are contracted ; and, as by this means, the capillary extremities of the arteries distributed in these places, do not afford a free passage to the blood conveyed to them, this blood is forced to return into all the interior parts, where it finds less resistance, such as the liver, the spleen, and the intestines. Hence the vessels of these viscera, being overcharged with blood, at last burst, and bring on inflammations and hemorrhages, which never fail to prove mortal. Hence 'tis obvious, that convulsions attending *wounds*, lay a foundation for a bad prognostic.

SECTION XXXIX.

**I**N patients of a sanguine constitution, the *wounds* are easily and quickly brought to a suppuration, on account of the laudable quality of their blood, which is oleous and balsamic, and which containing mild salts, diluted in aqueous particles, with difficulty loses its fluidity ; in consequence of which, the blood

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lodged!

lodged in the *wound*, and parts adjacent, is more speedily chang'd into pus.

## SECTION XL.

**B**UT this does not happen in persons of bilious and melancholic habits, whose blood is more acrid and destitute of aqueous parts; in consequence of which, the blood accumulated in the lips of the *wound*, or, stagnating in the vessels, must be more and more dried, and by that means rendered proper to enter into fermentation, and transform itself into pus. This is confirmed by daily experience; since, in persons of sanguine constitutions, we observe *wounds* beginning to suppurate on the fifth, sixth, or at most the seventh day; or, at least, appearing with signs, which indicate, that a suppuration will soon happen: Whereas in persons of bilious and melancholic habits, the suppuration does not begin 'till the eleventh, or fourteenth day, and in melancholic constitutions it sometimes happens later.

## SECTION XLI.

**A**S the large quantity of corrosive salts, with which the blood of pocky persons abounds, renders it proper to produce considerable

able pain and inflammations in *wounds*, as also to form corrosive ulcers in them, when they come to suppuration, so the *wounds* of such persons are highly dangerous, and difficult to be cured.

## SECTION XLII.

**W**HEN, after the suppuration, a *wound* is fill'd with a natural red flesh of a firm consistence, 'tis a good sign; since it denotes, that the nutritive lymph, which oozes from the extremities of the blood-vessels, is in such a condition as to inspissate and coagulate itself, sufficiently to resist the efforts of the blood, and find new passages thro' the center of these lymphatic concretions; and this circumstance is absolutely necessary for the purposes of nature, which are to fill up the vacuity of the *wound*, and procure a cicatrix.

## SECTION XLIII.

**W**E may expect that a *wound* will be difficultly cured, if, when the suppuration ceases, the new flesh formed in the *wound* is hard, almost callous, and of a smooth surface; since these are signs, that the nutritive juice is too viscid, and disposed to coagulate too

too strongly, so that the blood cannot any longer convey the nourishment necessary for the vegetation of new granulations of flesh, on the surface of the former. By this means, the *wound* will not be filled with well conditioned flesh, and the cicatrix will not have that softness, and natural appearance, it ought to have.

## SECTION XLIV.

**T**HE soft and fungous flesh generated in *wounds*, after the suppuration, denotes, that the nutritive juice is too fluid, and that the action of the blood distends it too much, so that the cicatrix formed by it, is not sufficiently firm, but rises above the surface of the part wounded: A thing very disagreeable to the eye. As the too great fluidity of the nutritive juice, proceeds from the dissolution and acrimony of the mass of blood, it is a sign, that the cicatrix will be difficultly formed in such *wounds*. Besides, this soft and fungous flesh having no support, is easily corrupted or fused.

## SECTION



## SECTION XLV.

**I**N order to the formation of a cicatrix, the generation of the flesh must begin in all the circumference of the lips of the *wound*, and proceed towards the center. Hence the lips of the wounded skin, become so hard and callous, that they cannot push forth granulations of flesh to join those formed in the center of the *wound*, and the cicatrix will, course, be unequal and unseemly.

## SECTION XLVI.

**W**HEN flesh rises unequally in *wounds*, so that, in one part, it appears above the surface of the *wound*, and, in another, is too much depressed, 'tis necessary, in order to render the cicatrix equal and smooth, to cut or burn the luxuriant flesh, which retards the formation of the cicatrix; so that the inequality of the flesh, rising after the suppuration of *wounds*, is a sign, that they will require a long time to their cure.

## CH A P. VII.

*Of the cure of wounds, in general.*

IF we have but an idea of a *wound*, 'tis no hard task to discover the intentions to be pursued in its cure; since, the union of the parts is directly opposite to their preternatural separation, or division. Every one, therefore, must be convinced, that the only intention to be pursued in the cure of *wounds*, is the re-union of the divided parts. But men, equally conversant in the theory and practice of surgery, can only determine the means necessary to be used, in order to procure this re-union; and this is at present what we intend to do in the most succinct and intelligible manner we possibly can; especially, since the most skillful practitioners are not agreed, with respect to the method of treating considerable *wounds*; and since the experiments they advance, to confirm their respective sentiments, are of equal force and weight: But the following reflections may serve to terminate all these disputes.

## SECTION

## SECTION I.

**T**IS certain, that the cut extremities of a part, which has suffered a solution of continuity, can never so unite as afterwards to form a continued substance, unless they are brought into contact; since, the union of bodies only consists in the intimate reciprocal and permanent contact of their parts. 'Tis therefore obvious, that the first intention to be pursued in the cure of *wounds*, is to bring their lips into contact, when the nature of the *wound* will admit of it.

## SECTION II.

**T**IS absolutely necessary, in order to facilitate the re-union of *wounds*, to remove all extraneous bodies, which being incapable of incorporating with the flesh, do, by their interposition, prevent the approach, and immediate contact of the divided parts. Thus, when a surgeon is called to a wounded patient, he ought to cleanse the *wound* of the grumous blood it contains, and extract the splinters of bones, the fragments of arms, or any other extraneous substances included in it; since, he  
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cannot expect, that the lips of the *wound* should be re-united; unless he takes all these precautions.

### SECTION III.

**I**N order to procure the consolidation of *wounds*, 'tis not sufficient, that the lips be brought into contact, but they must be kept in that state for some time ; since they do not cohere, by means of simple contact, but in consequence of a certain nutritive glue, which becoming gradually thicker, by the slow and insensible evaporation of its aqueous parts, fixes the lips of the *wound* to each other, by applying itself to their surfaces, and this is an effect which requires time.

### SECTION IV.

**I**F we would have a cicatrix formed speedily, and without danger of being afterwards destroyed, we must not only bring the lips of the *wound* into contact, and maintain them in that situation; but we must also take care, that the blood be in such a state, that the nutritive lymph it furnishes, in order to join the divided parts, may be disposed to coagulate

coagulate, and assume a due consistence ; which cannot happen, unless it is pure, and free from all mixture of the extravasated blood, and neither too fluid nor too acrid, nor discharg'd in too small, nor too large a quantity.

## SECTION V.

**V**ARIOUS symptoms frequently happen in *wounds*, and hinder their re-union, such as intense pains, violent inflammations, and convulsive motions ; for which reason we ought to be highly careful, either to prevent, or remove all these symptoms, which hinder and retard the formation of the cicatrix.

'Tis to be observed, that all *wounds* are not of such a nature as to admit of a re-union of their lips ; since, in some, such a re-union is absolutely impossible, and in others, of no manner of use. But in order to illustrate this farther by an example, let us suppose a *wound* inflicted in a muscle, in a direction transverse to that of the fibres : It is evident, that, in this case, the divided parts so strongly recede from each other, that it is not possible to surmount their natural elasticity, which keeps them thus divided. But this is nevertheless necessary, in order to bring them into contact. We have

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not, indeed, the same obstacle to surmount in some *wounds*, where large vessels are cut; but as *wounds* of this kind always threaten an hemorrhage, or, at least, as the vessels which have been tied, or to which styptics have been applied, in order to close their orifices, must necessarily come to a suppuration, 'tis evident, that the bringing the lips of such *wounds* into contact, would be useless in the beginning of the cure. The same holds true with respect to *wounds* made by contusion; for their lips which are contused, and almost mortified, must naturally suppurate before they can, thro' their extremities, afford a passage for the nutritive juice, which is to re-unite them; and tho' this juice could be conveyed thro' vessels absolutely mortified, yet it would not be in a condition to incorporate with parts entirely destitute of life; so that it would be absurd to bring the lips of contused *wounds* into contact, before they are suppurated.

FROM what has been said, 'tis sufficiently obvious, that the five intentions we have mentioned for the cure of *wounds*, cannot be followed in the cure of all *wounds*, but only in such as are simple, and made by incision, without a *wound* in many large vessels. However, as



in order to the cure of *wounds*, 'tis necessary to unite and fix their lips to each other; and as in some cases, the nutritive lymphatic juice is not capable of doing this, the cure must be promoted by the vegetation of new flesh. We ought, therefore, in all *wounds*, whose lips cannot be brought into contact, carefully to promote the generation of new flesh, whose granulations meeting with each other, incorporate and repair the lost substance.

In order to obtain this end, our first care ought to be to procure a laudable suppuration of the surface of the lips of the *wound*, in order to free them from the blood, which the contact of the air has rendered grumous and coagulated in their vessels.

In the second place, when the suppuration has entirely ceased, we must promote the generation, or efflorescence of new flesh, cleanse the bottom of the *wound* carefully, from every thing capable of destroying or corroding the texture of the flesh, already formed; or of dissolving the nutritive juice, in proportion as it is discharged, or of hindering it to thicken and assume due consistence; such as sanies, and especially pus, or the nutritive juice itself, corrupted by its  
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continuance. This end is obtained by the use of proper deterfives.

THE third intention to be answered in the treatment of *wounds*, whose lips cannot be brought into contact, is to procure to the new generated flesh, strength and firmness enough, so that it may serve as a kind of glew to the separated parts, and keep them in their natural situation. This intention is excellently answered by drying remedies, which absorb the superfluous humidity, which soaking the new flesh, hinders it from acquiring strength and solidity, and consequently of forming what we call a cicatrix in *wounds*. For which reason we may call the remedies of this kind, *cicatrizing medicines*.

## SECTION VI.

IN a word, in the treatment of *wounds* of this kind, we ought to be careful to remove, and especially prevent, all symptoms which may either prevent, or retard their supuration, mundification, and cicatrization.

## CHAP. VIII.

*Of the method of treating simple wounds.*

WE call those simple *wounds*, in which neither any large vessel is opened, nor any considerable nerve, or tendon, wounded. In order to prevent the suppuration in such *wounds*, which is always disagreeable to the patient, five intentions are to be pursued: The first is, to remove from the *wound* all extraneous bodies; the second, to bring their lips into immediate contact; the third, to keep and maintain them in this state; the fourth, to take care that the blood and humours be of a good and laudable quality; and the fifth, to prevent the symptoms which are capable of hindering the re-union of the divided parts. The surgeon who inclines to be successful in all these respects, ought carefully to examine in what manner the *wound* has been inflicted: If it is simple, and without any injury of the large vessels and nerves; or, if it is compound and dangerous. These things may be ascer-

tained, by examining the deepness and extent of the *wound*; by enquiring into the nature and form of the instrument which inflicted it; and by a previous knowledge of the structure of the parts wounded. When we are certain that the *wound* to be treated is simple, and have removed all extraneous bodies, as hairs, pieces of the cloaths, gravel, or any others, if they are contained in the *wound*, we must let the blood flow 'till it stops of itself, after which we are carefully to cleanse the *wound* with soft lint, or, it is even expedient to wash it with tepid red-wine, in order to remove the extravasated blood; which corrupting, and becoming putrid in the bottom, would afterwards ferment, and separate the lips of the *wound*, if we were to bring them into contact, without taking this precaution. After this, we are carefully to prevent the access of air into the *wound*, lest it should, by its contact, coagulate the blood, or nutritive juice circulating in the lips of the *wound*, and by that means dispose them to supuration, which cannot be too carefully avoided. But as among all soft and fluid bodies, none are less pervious by the air, than such as are *punguous* and *oleous*, so with these we are to rub the lips of the *wound*, when they are brought

brought into contact, after which they are also to be applied over them ; among all pinguious substances, the most proper to be used for this purpose, are *liquid peruvian balsam*, *balsam of judea*, or *simple turpentine* ; and, if these cannot be had, we may, in their stead, use oil of *nuts*, or oil of *olives*, provided they are not rancid. The method of using these medicines, is to soak a soft compress in them, and apply it warm to the *wound*. After uniting the lips of the *wound*, we must endeavour to retain them in that situation, by means of proper compresses and bandages, the application of which is better learned by practice, and an examination of the configuration of the wounded part, and of the form of the *wound*, than by reading all the directions given for that purpose by *Galen*, and the modern chirurgical authors. 'Tis to be observed, that the bandages ought to be of soft and previously worn linnen, and that they ought not to be directly applied to the *wound*, which is to be defended by a single compress, or even by two, one on each side, in order to maintain the lips in contact, and serve as a support to the bandage to be applied over them, neither too tight nor too slack ; for, if it is too slack, it will not sufficiently compress the lips

of the *wound*, which will consequently be easily put out of their proper situation; if, on the other hand, the bandage is too tight, the strong compression will either excite an inflammation and pain in the lips of the *wound*, which are terrible symptoms, or by intercepting the course of the blood returning to the heart, from the parts on the other side the bandage, it will occasion a painful inflation and inflammation in these parts, a symptom whose consequences are always to be dreaded, tho' it should happen to be but slight in itself.

As the blood circulates with greater difficulty in the part to which the bandage is applied, than in any other, on account of the compression of the vessels in various parts, 'tis necessary, by the application of proper remedies to prevent the total stagnation, and inspissation of the blood lodged here and there. For this reason, 'tis expedient, during the first seven days, to moisten the compresses and bandage with *warm red wine*, or *spirit of wine*, quickened with *spirit of sal ammoniac*, or any other spirituous and penetrating substances, which insinuate themselves into the pores of the skin, enter the vessels, and excite in the humours, circulating in them, a fermentative motion, which



which hinders their coagulation, and promotes their circulation. At the end of this time, if the pain and heat of the part are not insupportable, and consequently, a suppuration is no longer to be dreaded, we may remove the dressings; since, by this time, the cicatrix is generally sufficiently firm, to require them no longer.

'Tis to be observed, that the *wounds* of certain parts do not admit of the commodious application of bandage, in consequence of which, 'tis difficult to retain their lips in contact; such are the *wounds* of the cheeks and nose. For this reason, surgeons have invented various other methods of retaining the wounded parts in a proper situation. Among other methods, is that of sewing the lips of the *wound*, in such a manner, however, as that the sewing is not continued as in the usual manner; for which reason, it is called the *interrupted future*. But, besides that, futures always leave an unseemly scar, which ought to be avoided, especially in *wounds* of the face; they are still attended with another disadvantage, which is, that if the threads passed thro' the flesh, should happen to break before the cicatrix is form'd, there is a necessity for a fresh future, which is a great hardship

hardship for the patient. Besides, the violent pain, accompanying this operation, induces an inflammatory tumor, not only in the parts thro' which the needles pass, but also in all the extent of the surface of the lips of the *wound*, and, consequently, lays a foundation for a suppuration, which is not only troublesome in itself, but also retards the re-union of the parts. In order to avoid all these inconveniences, a new method is invented, which performs at once the office of a bandage, and of a future; and as, in the use of this method, there is no discharge of humours, or penetration of the parts, its first inventors have called it the *dry future*; which is made in the following manner:

WE take two equal pieces of strong soft linen, cut into a form suited to the nature of the part and *wound*: We hem that side of each piece, which is to touch the lips of the *wound*, and to these hems sew streight and broad cords. Then we cover the sides of each piece, opposite to those on which the cords are fixed, with some liniment, composed of viscid and adhesive ingredients. Then the pieces of linen, thus prepared, are applied to the

the lips of the *wound*, over against each other; and when they adhere sufficiently to the skin, the lips of the *wound* are brought into contact by drawing the cords, and kept in that situation by tying knots on the opposite sides; liniments for this purpose, may be prepared in the following manner:

TAKE of the armenian bole, sarcocole, and powder of mastich, each half an ounce, incorporate all with the white of an egg, and with this preparation rub the cloths, before their application to the part.

Or,

TAKE of mill-dust, mastich, dragon's blood, and armenian bole, each half an ounce, and of the hairs of an Hare, a sufficient quantity; incorporate the whole with the white of an egg, and use in the same manner with the preceding.

INSTEAD of these we may use various adhesive plaisters, *shoe-makers wax*, or *turpentine*, mixed with the *armenian bole*, and *sarcocole*. The *dry suture* has this advantage, that it can be contracted and relaxed at pleasure, in consequence of which, we may easily observe what

what passes in the *wound*, and cleanse its lips.

ON account of the above-mentioned inconveniencies attending futures, we rarely have recourse to this operation, even in considerable *wounds* of other parts, such as transverse *wounds* of the muscular parts; and I do not know, whether at present, futures are employed on any other occasions than in large *wounds*, which penetrate into the cavity of the abdomen; since there is no other means of hindering the intestines from falling out at such *wounds*, but by performing the future called *gastrophylaxis*. When the intestines are opened, 'tis also customary with surgeons, to make the future called the *glowers sitch*, in order to prevent a discharge of the *feces*.

THE use of futures is entirely exploded, in treating the *wounds* of other parts. Skilful surgeons are not, however at present, afraid to re-unite the extremities of divided tendons, and this practice some times succeeds, especially in patients of good constitutions. Lastly, in order to preserve the laudable quality of the blood, which is necessary to the consolidation of *wounds*,

*wounds*, the patient must observe a proper regimen, and use the medicines which we shall specify in the chapter concerning the internal treatment of *wounds*.

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## C H A P. IX.

*Of the method of treating compound wounds.*

**I**N large *wounds* made by incision, or contusion, the surgeon has two intentions to pursue, before the application of the first dressing. The first of these intentions is, to remove extraneous bodies from the *wound*; and the second, to stop the hemorrhage. In order to answer the first intention, we must place the patient, as much as possible, in the same posture he was in, when he received the *wound*; since, by this means, we may, with the greater facility, introduce the probe into the *wound*, by the same passage thro' which any extraneous bodies entered. We must also examine whether these extraneous bodies, discovered by the probe, can be extracted by the same passage thro' which they entered.

entered. If this is possible, the operation ought to be forthwith attempted, either by the *crow's bill*, the *swan's bill*, the common *terebra*, or some other instruments of a similar nature. If, on the contrary, the orifice of the *wound* is too narrow, or, if we meet with any obstacle in introducing the probe, we must, with the bistory, dilate the orifice of the *wound*, in order to facilitate the access of other instruments into the internal parts. 'Tis, however, principally expedient to be sure of the figure of the extraneous body, contained in the *wound*; and to examine whether it can be extracted without danger; or whether it is situated near large vessels, which might be wounded in the attempt. Thus, when the extremity of an incurvated dart, is lodged in a *wound*, 'tis sufficiently obvious, that it cannot possibly be extracted without a considerable dilaceration of the parts. For this reason 'tis proper, either to leave it, or any other bodies which cannot be extracted in the *wound*, or, by a counter-opening, to procure a discharge for them, from the part opposite to the *wound*. If large vessels are opened, or entirely divided, so that the violent hemorrhage lays a foundation for sus-  
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pecting a syncope, a deliquium, or an exhaustion of strength, this symptom must first of all be removed, as being of the greatest importance, after which the extraneous bodies are to be extracted.

In order to stop the hemorrhage from the large vessels, we must cleanse the *wound* in such a manner as to discover the orifices of the vessels which discharge the blood; and if it is probable that the hemorrhage may be stopped, by means of a common topical astringent, we may forthwith apply the following preparations:

TAKE of succotrine aloes, and male incense, each equal quantities; mix the whole with a quantity of the whites of eggs, sufficient to reduce it to the consistence of honey. Incorporate this mixture with the hairs of an hare, or with lint, to be applied to the orifices of the vessels, and the whole of the *wound*.

Or,

TAKE of the powder of armenian bole, colcathar, and mastich, each half an ounce; mix all together, apply to the open'd vessel, and keep the preparation

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on with pledgets or tents, sprinkled with the same powder.

IF the hemorrhage continues, notwithstanding the use of the usual astringents, we must apply to the opened vessel, vitriol wrapt up in lint, and procure a compression of it with tents, and pledgets, secured with compresses and bandage; some prefer the spirit of vitriol, to vitriol itself, and dip the pledgets they apply to the opened vessels, in this spirit. But such a stiptic is attended with many inconveniencies, which may justly render it suspected in practice; for it not only excites intense pain, but also by its acid spicula coagulates the blood, which is lodged in both the divided and sound vessels distributed thro' the lips of the *wound*, and this coagulation extends itself pretty far. Hence it is, that the parts surrounding the open'd vessels happening to corrupt and come to a supuration, also corrupt the vessels, which, in consequence of this circumstance, open themselves afresh, and produce a new hemorrhage.

WHEN, therefore, the usual astringents are applied to no manner of purpose, the best method we can take is to lay hold of the opened vessel,

## on WOUNDS, &c.

vessel, and make a ligature upon it, taking care to unite with it some portion of the adjacent flesh, provided the nature of the wounded part admits of it. If the vessel is so shrunk up into the flesh, as to be concealed, we must make an incision 'till we find its orifice, and then make the ligature.

AFTER we have removed all extraneous bodies from the *wound*, and stopped the hemorrhage by means of compresses, rubbed with the common astringent mixture, prepared of armenian bole, and the white of an egg, we must fill the *wound* with pledgets, laid over each other, tho' not too compactly, applying a proper bandage over the whole. This first dressing must not be removed, 'till the opened vessels are closed, which happens some times sooner, some times later, according to the largeness or smallness of the vessels, and the difference of the remedies used; as for instance, at the end of one, two, three, or four days, when ligatures are not employed. However, in order to prevent, as much as possibly may be, the inflammatory tumors, which may be brought on by the stagnation of the blood, in different parts of the surface of the *wound*, occasioned by the compression of the bandage, and the shrinking up of the di-

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vided vessels, 'tis expedient to keep the blood in a due state of fluidity, that it may circulate freely, and be resorbed from the obstructed parts, into the cavities of the veins. This intention is answered by fomentations, prepared of warm wine, spirit of wine, or vulnerary spirituous liquors, applied to the dressings, and adjacent parts.

WE must not forget, first of all, to dilate the orifice of the *wound*, not only in order to procure the discharge of extraneous substances, but also, in order to prevent the various symptoms, which happen in consequence of the too great narrowness of *wounds*; for if a *wound*, whose bottom is very large, should happen to have a narrow orifice, it is highly difficult to introduce pledgets covered with proper medicines, without dilacerating the lips of the *wound*, and consequently producing violent pain, which being excited at every dressing, is not only a hardship on the patient, but also renders the cure more tedious and difficult. Hence 'tis necessary, first of all, sufficiently to dilate the orifice of the *wound*, as much as the nature of the wounded part will admit, and even the whole of its cavity, if there be any. Thus, as all *wounds*, especially those inflicted by

by musket-bullets, darts, or any other instruments, have not passages for the evacuation of blood or pus, such passages must be made, lest the pus or other humours, accumulated in the bottom of the *wound*, should form sinuses and fistulas, which would greatly retard the cure. The dilatation of the *wound* ought to be made in its lowest part, that the proper weight of the substances included in its cavity, may carry them off, and we ought, above all things, after the application of proper bandage and dressing, to place the wounded part in such a situation, as most effectually to favour the discharge of the matter contained in the *wound*; for it frequently happens, that the humours, which might have been discharged from the bottom of the *wound*, in an erect posture, remain and corrupt in it, when the patient lies on his back.

IN *wounds* of the tendons, their divided extremities recede from each other, and happening afterwards to suppurate in the parts in which they are included, this suppuration affects these and their adjacent parts: In order to prevent suppurations, which are accompanied with violent inflammations and acute pains, nothing is more proper and expedient, than to dilate such *wounds*, and discover the extremities of  
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the receding tendons, in order to apply proper remedies to them.

IN the first dressing of a *wound*, we ought not to be too sparing of the skin and flesh, but make the dilatation as large as possible; for it frequently happens that a dilated *wound*, afterwards, so shrinks up, and is contracted by the inflation of the lips, that we cannot, without difficulty, introduce lint, tents, and pledgets, generally used by surgeons, in order to convey medicines to the internal parts of *wounds*, and retain them there.

BESIDES, the surgeon is to observe, that if the dilatation he is forced to make, or the *wound* itself, have formed any angles, or shreds of flesh or skin, these are to be forthwith removed, so that the borders of the *wound* may form but one streight, or curve line, not interrupted by angles or shreds.

WE ought, also, in the first examination of a *wound*, to observe whether its aperture is sufficient to afford a discharge of the blood contained in the bottom, or of all the pus, which shall be afterwards form'd in it; or, whether it is not more proper to procure another more commodious passage for these substances, in the opposite and lowermost part of the *wound*; for if this appears  
necessary,

necessary, no time is to be lost, but the operation is forthwith to be performed, either with the knife, or some proper instrument. In order to be certain that the aperture made, penetrates into the cavity of the *wound*, we must introduce a sharp pointed probe into the *wound*, and pass it thro' the flesh, till its point appears without the skin; then by the assistance of this probe, we are to pass the bistory into the internal part of the *wound*, observing, if there is a necessity for cutting the muscles, not to make a tranverse incision, but one in a direction parallel to that of the fleshy fibres, for fear of rendering them incapable of acting for the future. And as the fleshy fibres, when separated in a longitudinal direction, either in contracting themselves, or when they happen to be inflam'd, so brace up the aperture made, that it is often impossible to introduce tents and pledgets, so we can never make this aperture too large.

WHEN we treat *wounds* made by any fire-arms, or any other contusing instruments, we ought carefully to cut off those parts, which are bruised, and, as it were, burnt in the lips of the *wound*, that is, we ought to render such *wounds* similar to those made by incision, by removing all the mortified flesh. This is the only



only method of bringing *wounds*, made by fire-arms, to a suppuration, otherwise they terminate in a mortification, and 'tis to be dreaded, lest a gangrene and sphacelus, seizing the adjacent parts, which are not wounded, should there produce the same fatal effects, as if they were occasioned by a quite different cause, which would greatly endanger the patient's life. But if the nature of the part, not being fleshy, such as the joints, should not permit the extirpation of the contused substances, we must make scarifications to the live parts, with the point of the scissars, and cut off the shattered parts in the lips of the skin.

If the *wound* is complicated with a fracture of the bones, we must enquire, with the greatest care, whether the fracture is too considerable, and the bones broken into too many small fragments, in order to expect, that they may be afterwards re-united. Thus, if large bones, such as the *femur*, the *tibia*, the *humerus*, the *cubitus*, or the *radius* are entirely fractured, and as it were shattered to pieces, the surgeon ought to do nothing to the *wound*, but proceed to stop the hemorrhage, and perform the amputation of the whole part; for when the bones are thus mangled and shattered, the part is no longer

longer proper to perform any of its usual functions and motions. With respect to this, the reader may consult the treatises upon amputations; but if the fracture is such, that a large portion of the bone remains uninjured; or, if we may hope for the re-union of its fractured parts, by means of a *callus*; or, if the portion of the fractured bone is divided into various fragments, we ought to be very attentive to the *wound*, in order to render ourselves certain of the precise place of the *fracture*. Then we are gently, and with great precaution, to extract all the splinters which are loose and disengaged, leaving those which adhere too strongly, either to the flesh, or periosteum, to remain, till the subsequent suppuration disengages them.

'T is also expedient to examine, whether it is more advantageous to extract the splinters, by the *wound* itself, and also, thro' it to convey remedies to the fractured bone; or, whether it would not be more proper to make, near the fracture, a fresh aperture, in order to facilitate, both the extraction of the splinters, and the application of medicines, either to the denuded bone, the periosteum, or the flesh. If this is thought necessary, we must immediately  
make

make a long and large incision, in order to discover the fractured bone. When the fracture is transverse, after dressing the *wound*, and applying the *open bandage* to the part corresponding to its aperture, we are to reduce the fractured pieces to their proper situation, and retain them in that state, by means of *splints* and *fannons*, that thus, when the *callus* has united the divided parts, the member may preserve its natural figure. The fannons and splints are to be secured by another open bandage, that thus the dressings may be renewed when necessity requires.

WHEN small bones, such as the phalanxes of the fingers, are entirely broken and shatter'd, we are forthwith to perform the amputation, in the next adjacent articulation, which remains uninjured, taking care to remove as much of the skin of the phalanx, both internally and externally, as is necessary to have the extremities of the tendons cut uncovered, even after they have shrunk back and receded from each other. By this means we avoid the pain, and other troublesome symptoms, which generally succeed the suppuration of wounded tendons, when they shrink up under the skin and teguments, where they become corrupted.

AFTER

AFTER taking all these precautions, we may remove the dressing at the end of one, two, three, four, or even more days, according to the nature of the *wound*, and the largeness of the vessels to be closed. But as this dressing, both on account of the heat of the lips of the *wound*, and of the viscid and tenacious substances with which it is covered, is strongly attached to the sides of the *wound*, and cannot be taken off without lacerating the parts to which it adheres, and exciting a violent pain, which is still the greater, the more the lips of the *wound* are inflated and distended with blood, we must, before removing it, moisten the lint with some proper liquors, such as *warm red wine*, mixed with an equal quantity of water, least it should by its acrimony, irritate the lips of the *wound*, which are at that time highly sensible. Instead of wine we may also use *barley-water*, edulterated with a little honey, or if none of these can be had, *common tepid water* is sufficient. They, who for this purpose use *spirit of wine*, or, *spirituous vulnerary water*, do not consider that this practice is the true method to augment the pain, which, in the treatment of all *wounds*, ought to be alleviated and asswaged. If any portion of lint adheres strongly to the lips of the *wound*,

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after it has been moistened, we must permit it to remain, without making any attempt to pull it away. All these measures ought to be taken, as expeditiously as possible, in order to apply a fresh dressing cover'd with proper medicines, as soon as the former is removed; for nothing is more prejudicial to *wounds*, nothing augments their pain more, nothing, in fine, is more proper to coagulate the blood lodged in the vessels, distributed thro' their surfaces, than to permit them to be long exposed to the air.

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## C H A P. X.

*A continuation of what relates to the treatment of compound wounds.*

**W**E now come to consider the method of answering the second intention to be pursued in the treatment of compound *wounds*; and to specify the medicines which ought to be used, in order to bring the inflated lips of *wounds*, of this kind, to a suppuration. Compound *wounds* then are to be distinguished into two sorts. The first species comprehends those *wounds*, which affect only the muscular parts;

parts ; and the second, those which affect nervous and tendinous parts. In the former case, that is, when muscular parts are only wounded, as the lips of such *wounds* can never come to a suppuration, unless the blood contained in their vessels has a sufficient space to rarify itself, by entering into a fermentative motion, which converts it into pus ; we ought, in order to procure this space for it, to relax the vessels which contain it, as much as possible. This end is most effectually obtained, by the use either of aqueous liquors, or of pinguous and unctuous medicines. But, as aqueous remedies have their parts separated from each other, and consequently, easily dissipated by the least motion, so that the immoderate heat of the lips of the *wound* does not permit them to adhere long to them, but soon evaporate them. Hence 'tis obvious, that this species of medicines is by no means proper, to bring on a suppuration in the lips of *wounds* ; and it would be to no purpose, continually to foment the parts with these medicines ; since such fomentations, by too much diluting and extending the saline parts of the blood, which by their motion must excite the putractive fermentation of that fluid, greatly hinder, and retard the suppuration. But

this does not hold with respect to pinguious and sulphureous substances, whose parts cohering strongly with each other, are not to be separated without difficulty, in consequence of which, the heat of the lips of the *wound* to which they are applied, not being able to dissipate and evaporate them, they remain adhering to them so long as to relax the vessels sufficiently for the conversion of blood into pus. There is also another reason for preferring pinguious and sulphureous substances, in order to promote the suppuration of *wounds*; which is, that they are impregnated with saline particles of various natures, such as acid, saline-acid, acrid, or saline-acrid particles, which, if considerably volatile, being agitated by the heat, penetrate the texture of the blood lodged in the lips of the *wound*, and by insensibly dividing its parts, dispose them to fermentation. Hence it follows, that the lint put into the cavity of a *wound* for this purpose, ought to be covered with pinguious and sulphureous medicines. For this purpose we ought not to choose such medicines as are suggested by theory, which, when alone, is always an unsafe guide, but such as from long experience have been found most efficacious



efficacious, preferring, at the same time, such as are most simple and easily prepared. As all these medicines act by digesting, and, as it were, ripening the blood contained in the lips of the *wound*, in order to change it into pus, we may call them *digestive*, *maturating*, and *superative* medicines. They may be prepared of a vast variety of ingredients, and in a great many different manners; but the most ordinary digestive is prepared thus:

TAKE of *Venice* turpentine, four ounces, two yolks of eggs, linseed oil, or that of lillies, worms or puppies, or even recent common oil, a sufficient quantity. Mix altogether for a digestive.

Or,

TAKE of the oil of violets, or that of linseed, three pounds, in which, boil two new born puppies, till the flesh comes off from the bones. To this add one pound of prepared earth worms. Boil over a slow fire, and pass thro' a linen cloth by expression. Then add of *venice* turpentine, three ounces, and of brandy, six ounces.

IF we incline to use this oil of puppies, the consistence of a thick balsam, is more commodious in dressing *wounds*, so that we may add a larger quantity of turpentine, two pounds for instance :

Or,

TAKE of the unquentum basilicon, four ounces, and of fresh butter, or oil of St. *John's* wort, the like quantity ; mix the whole for a digestive.

FOR rich persons we may use peruvian balsam, or that of judea, instead of the ordinary digestive.

SOME practitioners mix with these digestives, powders of myrrh and aloes, especially in *wounds* made by fire-arms, and contusion ; in order, as they say, to prevent putrefaction. But, as these remedies are acrid and sulphureous, they dry *wounds* by dissipating the serous parts lodged in them, so that they are less proper to procure, than to retard a laudable suppuration, by their irritation and constriction of all the vessels containing the blood, which ought to be converted into pus ; for these vessels, thus stimulated and contracted, by acting on each

each other, lacerate those which communicate with them, as well as all the parts to which they adhere, which considerably augments the pain. Other practitioners, who more carefully observe what passes in *wounds*, perceiving the danger of using *desiccative powders*, have entirely exploded this piece of practice handed down to us, as it were, by tradition from the antients; and by using the most simple maturing medicines, with the addition of emollient ointments, such as that of the marsh-mallows, they have observed that the suppuration of *wounds* is far better brought on and promoted. I am of opinion, that the custom of mixing *desiccatives* with *digestives*, has only been introduced by prejudice, and after having observed, that dead bodies embalm'd with the powders of aloes, and myrrh, became dry without being corrupted, dissolved, or putrified, surgeons were foolishly induced to think, that these powders were capable of preventing the putrefaction of *wounds* threatened with a *gangrene*. But those who have reasoned in this manner, and who first employed these kinds of remedies, have not adverted, how contrary their practice was to the intentions which ought to be pursued, in  
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the treatment of *wounds* ; for at the same time, that they intend to make the lips of the *wound* suppurate, that is, to excite a fermentative corruption of the blood lodged in the vessels of the wounded part, as well as the dissolution, both of these vessels, and of the proper texture of the lips of the *wound*, they do all they can to hinder this dissolution, and suppurative fermentation ; and consequently seem to undertake two opposite things, at one and the same time. The person who is accustomed to account for what he does in surgery, will easily perceive, that it is with no more reason that some other surgeons, sufficiently skilful in other respects, mix with *suppurative* and *digestive* medicines, *spirit of wine*, either *simple* or *camphorated*, or *tinctures of myrrh and aloes*, in order to prevent putrefaction.

AFTER having covered the pledgets with proper digestives, we must apply them to the interior part of the *wound*, tho' very dexterously and gently, for fear of exciting pain in the lips of the *wound* by too rude a contact. The lint employed for this purpose, ought also to be soft, in order to prevent the troublesome compression it would produce, if it was too compact. 'Tis necessary, in *wounds* of a large extent,

extent, to apply the most simple dressing; since, when it consists of various tents, pledgets, and compresses, it requires a long time for its application, in consequence of which, the air, by its contact, acts upon the *wound*, and produces the bad effects before-mentioned. In order to prevent these accidents, we must make a pledget of lint, large enough to cover the whole surface of the *wound*, and fill the remaining cavity with soft lint. The *wound* being thus dressed, we are to examine whether the wounded part is tumified, inflamed, or in its natural state: If we observe that not only the lips of the *wound*, but also the adjacent parts are inflated, that the skin is red, inflam'd, and hot, and that the patient perceives a painful pulsation in it, we are to use our utmost endeavours, to relax the inflamed parts and mitigate the pain, by moderating the too great rarefaction of the blood.

THERE are two different methods of lessening the painful tension of the vessels, and of all the texture of the tumified part. The first is, to restore to the distended and stimulated fibres their natural elasticity, that they may, by their contraction, force into their excretories, the humours contained in the vessels which they compose.

compose. The second intention is, to relax these fibres still more and more, till they are capable of yielding to the humours, which continually arrive into the vessels, or which are rarified by their fermentation.

WE may restore the tone and spring of the fibres distended by the inflation of any part, by some one, or other, of the three following species of medicines: First then, we may employ *astringents* or medicines, which being applied to any parts so concentrate them, as that they express their contained humours, and resist the effort of these conveyed to them. Or, secondly, we may apply to the inflated and tumified part, medicines capable of condensing the blood, and moderating the heat and expansion of the humours, such as actually or potentially cold remedies, commonly called *repellents*, with respect to their effect, which consists in producing in the elementary fibres of the inflamed part, such a corrugation as repels the humours conveyed to the vessels, towards the internal parts. Or, thirdly, we may use *resolvents* which divide, attenuate, and render the humours sufficiently fluid to yield to the efforts which the fibres of the vessels, and of all the inflated part, make to contract themselves.

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WE now come to enquire which of these medicines should be preferred, when we intend to restore the distended fibres of a tumified part to their natural state. 'Tis therefore, at first view, obvious, that the use of *astringents* ought in such cases to be dreaded; for the inequality of the constriction they produce in the cloths on which they are spread, is a reason they don't equally compress the parts to which they are applied, but constrict some of them more than others, without in the least altering the quality of the humours. Hence it is, that astringents only excite pain, by the unequal compression of the skin, and tho' the blood, which, by its stagnation forms the tumor, should happen to preserve its fluidity, which, on such occasions, is a desirable circumstance; yet, 'tis obvious, from what has been already said, that the use of astringents would not be capable to make this blood pass into the veins, which generally serve for its dissipation, and that the inequality with which they compress the part, would only force the humours from one part of the tumor to another less compress'd, but equally distended and inflated. Hence a greater distension, and consequently a more intense pain would be produced.

NEITHER



NEITHER can we expect a more happy effect from *repellents*, than from astringents. They will indeed moderate the pain; for, as they act by repressing the too great heat and rarefaction of the humours, and by compressing and coagulating them, 'tis not to be denied that the blood, reduced to a smaller volume, will leave an empty space, which will permit the distended fibres of the inflated part to collapse upon it, and gradually resume their contractile motion. But, on the other hand, the inspissation of the blood will oppose its expulsion from the vessels, by the contraction of the fibres, in consequence of which, it will be more and more indurated, and the tumor degenerate into a species of scirrus, which is one of the most terrible ways in which tumors terminate, and which is still more to be dreaded in *wounds*. These reasons are, in my opinion, sufficient to deter us from the use of repellents, when we intend to mitigate the painful tension of a wounded part.

*RESOLVENTS* are attended with none of these inconveniencies, and have this additional advantage, that they break and attenuate the gross molecules of the blood stagnating in the wounded parts; so that the fibres, contracting themselves,

themselves find no difficulty in forcing it into the veins. These are the reasons which induce us to apply *resolvents*, to such wounds as are tense and tumified, rather than *astringents*, and *repellents*.

WE do not, however, totally exclude astringents, and repellents, from the treatment of wounds, since they are some times necessary, especially to prevent the inflation of the lips, and adjacent parts of a wound, provided we apply them as soon as the wound is inflicted, or soon after. In a word, these remedies fortify the tone of the wounded part, and put it in a condition to resist the afflux of the humours, and prevent their accumulation in it. For this reason, when a wound is inflicted, we may, in the first dressing apply an astringent medicine, such as the following.

TAKE of armenian bole, and meal-duft, each equal quantities, and of gum tragacanth one fourth of the preceeding ingredients; mix the whole with a sufficient quantity of the whites of eggs, and with this preparation, rub a piece of folded linen, to be applied to the part wounded.

*Resolvents*, to be applied to *wounds* accompanied with tumors, may be prepared in various manners ; thus for instance,

TAKE of the meal of the bitter vetch, or of beans, or of the crumb of bread, one pound, make it into a cataplasm, with a sufficient quantity of red wine.

*Or,*

FOMENT the tumor very frequently, with rectified spirit of wine.

*Or,*

TAKE of the pulp of the leaves of pellitory of the wall, or of dwarf-elder, or of garden night-shade, or of hen-bane, a sufficient quantity, soak sufficiently in spirit of wine for a cataplasm.

*Or,*

TAKE of the flowers of camomile and melilot, each an ounce ; of the tops of rosemary and thyme, each a pugil, boil the whole gently in red wine, with which the wounded part is to be frequently fomented.

THE cataplasms made with the above-mentioned meals, with crumbs of bread and wine, or with the pulp of the herbs specified, are most proper for *wounds* of the nervous and tendinous parts. But, in *wounds* of the muscular parts, it is more expedient to use *spirit of wine*, either *simple* or *quickened*, with *sal ammoniac*.

It often happens, however, that when the blood is too thick and acrid, the use of resolvents inflates the wounded part considerably, and consequently augments the tension, pain, and heat. In order to remove these symptoms, we must forthwith have recourse to *relaxing* and *emollient* substances, such as pinguious, oleous, aqueous substances, or such as partake of all these qualities. Among the pinguious, and oleous remedies, the most safe and efficacious are, *oil of roses*, that of *St. John's wort*, that of *earth-worms*, that of *puppies*, that of *ricks*, and that of *eggs*; but, if these cannot be had, we may safely use good *olive oil*. All these remedies ought to be tepid, when the inflamed part is rubbed with them; and they are principally proper in *wounds* of the tendinous and nervous parts, but almost never in those of the muscular parts.

AMONG the emollients, which are partly aqueous, and partly oleous, the best and most efficacious are the following cataplasms:

TAKE of the pulps of the roots of marsh-mallows and lilies, of each two pounds; and of the meal of linseed, four ounces; mix all up into a cataplasm.

*Or,*

TAKE of the pulp of the leaves of mallows, and bears-brich, each two pounds; of linseed meal, four ounces; and of oil of roses, a sufficient quantity; mix up all for a cataplasm.

*Or,*

TAKE of the crumb of white bread, one pound; and of goats milk, three pounds; boil all to the consistence of a cataplasm; to which add three yolks of eggs, and a sufficient quantity of the oil of worms.

*Or,*

TAKE goats milk, two pounds, and of linseed meal; eight ounces; boil to the consistence of a cataplasm.

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'Tis to be observed that these cataplasms, ought to be changed at least twice a day, tho' without removing any of the rest of the dressing: We may, however, permit the same cataplasim to remain on, provided we take care to moisten it now and then, and foment the part with some emollient decoction, such as that prepared of the roots of *marsh-mallows*, *mallows*, *bears-brich*, or even *tepid milk*.

THESE measures being taken, we must wait till the lips of the *wound* come to a suppuration; but if we incline to hasten this suppuration, and not to disturb it when it commences, we must defend the *wound* from the contact of the air, and consequently not change the first dressing, which is covered with proper digestives, till the end of two or three days, unless the violence of the pain denotes that some considerable change has happened in the *wound*, and lays a foundation for suspecting a gangrene; in which case, we must now and then remove the dressing, that we may be the better able to avert the impending danger. But if the pain is very intense, if the patient does not perceive a sense of burning, and lancinating pains; and if we do not observe, that the wounded part is more cold than usual, we ought to leave the dressing

till there is new flesh generated in the room of the parts which were contused or inflam'd, and which ought to be destroyed by the supuration; and this does not happen till the third or fourth day.

WE ought above all things to take care that neither pus, purulent matter, nor sanies be permitted to remain in any recess or corner of the *wound*, and insensibly form *fistular sinuses*, in the interstices of the muscles. For this reason we are, with soft lint, to remove the pus and sanies, taking care to excite as little pain to the patient as we possibly can. But, in order to cleanse the *wound* the better, we must soak a sponge in the warm decoction of marsh mallow roots; and gently raising up the dressing, we must express this decoction into the *wound*. Then the dressing is to be totally removed, and another forthwith applied, without taking the trouble of cleansing the *wound* from the decoction, lest the blood coagulating in its surface, if it should remain long expos'd to the air, should bring on a new inflammation. In order to prevent this action of the air, 'tis even necessary to place a stove full of live coals near the *wound*, unless the intense heat of the season should render this precaution unnecessary.

WHEN



WHEN the *wound* to be treated is very deep, and penetrates so far into the flesh that we cannot introduce pledgets, we ought by no means to cram hard tents into its cavity, under a pretence of conveying digestives into it, if we intend to spare the patient a continual, and prevent a tedious inflammation of the lips of the *wound*. 'Tis far better to inject into these long and narrow *wounds*, *turpentine* dissolved in a little oil, or *common digestive*, or *unquentum basilicon*, previously melted. Then we are, in the usual manner, to cover both the cavity and orifice of the *wound* with soft pledgets, cover'd with digestives.

WHEN the suppuration begins to diminish, and, when red and florid granulations of flesh appear in all the extent of the *wound*, we are entirely to desist from the use of ointments, lest the suppuration happening to continue, should bring on a *marasmus*, by the continual dissipation of the nutritive juice, and lest fungous flesh should be formed about the lips of the *wound*, we are therefore, in this case, to proceed directly to the use of *deterfives*, among which, none are more efficacious than warm mineral waters, especially those of *balnearum*, which have this advantage above most others,  
that

that they may be kept for a whole year without losing their virtues, provided they are kept in close stopped vessels. As for their efficacy in the treatment of *wounds*, a course of twenty years experience has taught the physicians and surgeons of *Montpelier*, that they were productive of the happiest effects; but nothing more effectually confirms this practice, than the unexpected and miraculous cure of the duke of *Orleans*, who, at the siege of *Turin*, was dangerously wounded near the carpus of the left hand. The *wound* had contus'd, and lacerated two tendons of the *musculus sublimis*, namely, that which goes to the ring-finger, and that which bends the little finger. A burning fever soon appeared, and a gangrene not only of the *wound*, but also of the whole arm, was apprehended. These terrible symptoms were at last abated, and the contused flesh and tendons came to a suppuration. But, at the end of this suppuration, the application of the mildest remedies only excited intense pain, which induced the physicians and surgeons to plunge the Duke's arm in the waters of *balarnut*, which produced so happy and remarkable an effect, that in less than an hours time the pain was totally removed, and the inflation sensibly diminish'd.

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The fingers, which were before contracted, began to extend themselves, so that the *wound* which was near four inches in diameter, was so cured by the continual use of the waters of *balaruc*, by way of bath, and pledgets soaked in them, that no fungous flesh was generated, and the *wound* in fifteen days reduced to an inch in diameter.

FOR this reason we ought to cleanse *wounds* three or four times a day, with tepid *balaruc-water*, and only cover them with simple pledgets, dipt in the same; for 'tis far better frequently to cleanse *wounds*, when new flesh begins to push out, than to be several days without renewing the dressings, as some surgeons of the army do, who are too apprehensive of the access of the air, which they account fatal to *wounds*. I agree with them, that we ought to expose *wounds* as little as possible to the air, and change the dressings with all expedition, in order to prevent the coagulation of the nutritive juice and blood, circulating in the surface of the *wound*; but I can hardly approve of the practice of those, who do not change the dressings but every three or four days, even after the suppuration has ceased; for before the new generated flesh has acquired the firmness of

a cicatrix, its texture is so weak and delicate, that it permits a nutritive lymph to ooze out into the cavity of the *wound*, where this lymph being forthwith deprived of its spirituous parts, changes its nature, and, happening to ferment, contracts an acrimony, by which it corrodes the flesh, and renders it either too soft, or too hard, and indurated.

IF it should be said that the coagulation of the nutritive juice, and blood in the surface of the *wound*, is no less to be dreaded than the other symptoms of which we are so apprehensive. I answer, it is so. But at the same time 'tis easy to prevent this coagulation, by guarding the *wound* against the bad impressions of the air, not only by the application of warm deterfive medicines, with which we may also moisten and wash the *wound*; but also by correcting the cold state of the air, by means of stoves, full of live coals.

BUT as the *balaruc*, and other simular waters cannot be had elsewhere, the following deterfives may be used in their stead.

TAKE of the strong lexivium of ashes, one part; and mix with five parts of spring or river water, with which the *wound* is to be fomented.

Or,

TAKE of the lexivium of the ashes of the plant periwinkle, agrimony, St. John's wort, wormwood, or germander, one part; and mix with five parts of spring water.

Or,

TAKE of the roots of gentian, and birthwort, each two ounces; of barley, two pugils; of the flowers of St. John's wort, and red roses, each three pugils. Boil all in a sufficient quantity of spring water; and to four pounds of the strained liquor, add four ounces of the honey of roses, or of white wine.

Or,

TAKE of spring water, four parts; and mix with one part of spirit of wine.

WE may, if we please, foment the wound with red or white wine, either pure or mixed with water; or, we may, for the same purpose, use spirit of wine, mixed with water, in which, however, we have previously infused wormwood,

wormwood, germander, and the flowers of St. John's wort.

AFTER having continued the use of *deterfives*, till the cavity of the wound is filled with flesh, and the cicatrix has begun to form itself in the margins of the wound, we must sprinkle this new flesh with desiccative and cicatrizing remedies, such as *prepared tutty*, *litharge*, *lapis calaminaris*, *ceruss*, *calcined lead*, *pompholix*, and *seald earth*, reduced to an impalpable powder. We may also apply to the wound, pledgets, sprinkled with the same powders, and continue the application of them 'till the cicatrix is entirely formed. We may also substitute in the room of these powders, the ointment of *tutty*, the *diapompholigos*, or the red desiccative ointment.

IF there is generated in the wound, flesh which is not granulated and unequal, but smooth and soft, as flesh of this kind is soon colliquated and changed into *sanies* or *pus*, we must accelerate the cure, and destroy such flesh by the more acrid *deterfives*, or even by *catheretics*. For this purpose, we may mix with the common digestive, a sufficient quantity of the powder of *myrrh* and *aloes*, or with a third or fourth part of the *unquentum ægyptiacum*.

Or

Or, we may dress the *wound* with *balsamum veneris*, which is prepared in the following manner :

TAKE of verdigrease philosophically prepared, two ounces ; and of oil of turpentine, one pound ; digest by a slow sand heat for fifteen hours, at the end of which time pour off the green oil swimming on the surface, and preserve it for use.

INSTEAD of this, we may also use the *green balsam of metz*.

Or,

TAKE of white, or red precipitate, and of calcined alum, each two drams ; and of the *unguentum basilicon*, three ounces ; mix all together, and cover the dressings with this ointment.

Or,

THE fungous flesh is to be gently touched, with the common *lapis infernalis*.

BUT, in order to prevent the generation of fungous flesh, we ought to be principally careful to correct the peccant state of the blood, or to preserve its quality, if laudable.

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WHAT we have hitherto said, with respect to the treatment of compound *wounds*, only relates to such as are inflicted in muscular parts, so that we now come to consider the method of treating *wounds* of the nerves and tendons.

'TIS therefore to be observed, that if a tendon is almost entirely cut, so that 'tis to be dreaded lest a suppuration should destroy what remains of it, we must divide it totally, in order to prevent the symptoms which may ensue. Besides, we must by no means apply to cut nerves and tendons, when uncovered, the usual *digestives*, or any balsams capable of procuring a suppuration; since the salts, with which these medicines are impregnated, render them too irritating to be applied to so sensible parts, without exciting intense pains. In such cases, therefore, 'tis sufficient to use common oil of turpentine, or, if this cannot be had, yellow or red oil, distilled in the usual manner from turpentine, and afterwards distilled three or four times with spring water, in order to divest them of the saline particles, which they contain, and which would render them too active. Pledgets dipt in these oils, are to be applied to wounded nerves or tendons. But the rest of the *wound* is to be dressed in the usual

usual manner, with the *digestives* already described.

SOME order cut nerves, or tendons, to be dressed with *tincture of myrrh*, or *spirit of wine*, in order to prevent corruption and putrefaction. But 'tis certain from experience, that nerves or tendons, whether only uncovered, or contused, or wounded in any other manner, are never again covered with flesh, and cur'd, till their surface, and sometimes their whole texture comes to a suppuration, which cannot happen without putrefaction and corruption; so that, in such cases, 'tis highly absurd to use the *tincture of myrrh* and aloes, or any other spirituous vulnerary waters.

BESIDES, the enormous pain, which ought always to be avoided in *wounds*, and which continually succeeds the applications of spirituous remedies, to so sensible parts as the nerves and tendons, ought to induce us to explode such remedies in the treatment of *wounds* of this kind, especially since the dryness they produce greatly retards the suppuration. 'Tis also to be observed that spirituous remedies, applied to nerves or tendons, are easily dissipated and evaporated, by the intense heat of wounded parts. Whence it happens, that tents, or dressings,

dipt in such liquors, becoming soon dry, absorb the serum discharged from all the extent of the *wound*, so that the nerves, or tendons, are continually moistened by this serum, which however, is highly prejudicial both to the bones and nervous parts. But all these inconveniences are avoided by the use of various oils, obtained from turpentine.

As for *wounds* complicated with a fracture of the bone, they are to be treated like other *wounds*, unless the bones are laid bare, in which case they require a different treatment. We ought, in such cases, principally to take care that the pus and sanies, impregnated with acrid and corrosive salts, do not corrode the bones, and render them carious; and as bones, deprived of their periostium, rarely unite with the flesh before they exfoliate, that is, before their external lamina, which has been exposed to the influence of the air, falls off by way of scales, which cannot happen sooner than twenty or thirty days, so we ought to keep their surface as dry as possible. For this reason we must avoid the application of pinguious and oleous remedies, which are capable of softening and relaxing the texture of the bones, and consequently of preventing their exfoliation. Bones  
are

are therefore to be dress'd with simple spirituous liquors, or with the antiseptic powders, such as those of *myrrh*, *aloes*, *incense*, *gentian*, and *euphorbium*, with which we are to sprinkle the pledgets to be applied to uncovered bones, or we may dip these pledgets in *tincture of myrrh*, and *aloes*, or, in simple spirit of wine. Several of these pledgets are to be laid above each other, in order to absorb the pus or sanies, which being discharged from the suppurating flesh, would greatly injure it. We must also take care to prevent the generation of fungous flesh, which would prove an obstacle to the commodious dressing of the bone; neither must we think of cicatrizing the *wound*, till the exfoliation is entirely terminated, and the surface of the bone covered with florid granulations of flesh.

A *gangrene* and *sphacelus*, demand the particular attention of the surgeon, especially, since these symptoms, happening in the slightest *wounds*, expose the patient to uncommon danger. As soon, therefore, as we perceive the sign of an approaching gangrene, such as a deep red colour, accompanied with a violent tension, and a sense of burning; or, if the part becomes pale, inflated, œdematous, numbed, or extremely livid; or, if instead of being hot

and burning, it becomes cold, or begins to be insensible, there is no time to be lost.

WHEN, therefore, the excessive tension and heat of a part, lay the foundation for dreading a gangrene, we must by scarifications procure a discharge of the blood lodg'd in the lips of the wound, and adjacent parts. In order to diminish the too violent fermentation, and rarefaction of the blood, we may apply *emollient* and very gently *resolvent* cataplasms, which may be prepared in the following manner:

TAKE of cow's dung, two pounds; soak in a sufficient quantity of the decoction of marsh-mallow roots, and linseed, to make a cataplasm to be applied to the part affected, which is also to be frequently fomented with the said decoction.

Or,

TAKE of the meal of bitter vetch, beans, and fenugreek, each six ounces; and of red wine, a sufficient quantity, to form into a cataplasm to be applied to the part affected, which is to be moistened now and then with wine.

IF these remedies augment the pain and sense of burning, we may apply a cataplasm, prepared of the crumb of bread and milk, or the following.

TAKE

TAKE of the bulbous roots of lilies, and marsh-mallows, or mallow leaves, each two pounds; of the meal of bitter vetch, six ounces; and of linseed oil, or oil of worms, a sufficient quantity to make a cataplasm.

BUT if an approaching *gangrene* is indicated by the paleness of the *wound*, an œdematous tumour, and numbness, we must employ *stimulating*, *hot*, and *resolvent* medicines. Thus for instance,

TAKE of cow's dung, two pounds; foot, half a pound; and of putrified urine, a sufficient quantity to make a cataplasm, to be applied to the part, and moistened now and then with urine or spirit of wine.

'TIS however to be observed that this last cataplasm, is not proper in the first case, since it would considerably augment the heat and pain, and instead of preventing the gangrene, which might have been done by milder applications, it would infallibly, and speedily bring it on. The following would also produce the same effect, and is only proper in the second case.

TAKE

TAKE of the leaves of dwarf-elder, or elder, two pounds; of the seeds of carrot, bitter vetch, and lupins, each three ounces; and of corrupted urine, or spirit of wine, acuated with that of sal ammoniac, a sufficient quantity to make a cataplasm, to be applied to the part affected, and continually moistened either with urine, or spirit of wine.

WHEN a gangrene is preceeded by lividity, loss of sensation, and the coldness of the wounded part, we are forthwith to make scarifications of the live parts, and with the bistory remove all the mortified part, or destroy it with *catheretic* or *caustic* remedies. If the gangrene is superficial, we must first bath it with *camphorated spirit of wine*, acuated with *that of sal ammoniac*, and afterwards rub it with the *unguentum ægyptiacum*, continuing, afterwards, to foment it with *camphorated spirit of wine*; or, we may apply the following cataplasm.

TAKE of the meal of lentils and lupins, each one pound; and with a sufficient quantity of the decoction of wormwood, sage, and marjoram, make a cataplasm to be applied to the part, and continually  
moistened



moistened with the same decoction, or camphorated spirit of wine.

BUT if a gangrene spreads far into a *wound*, and the adjacent parts, we must destroy all the corrupted parts either by the *knife*, or the most powerful caustics. For this purpose we must foment the part with pledgets dipt in the *common phagedenic water*, which is prepared in the following manner :

TAKE of corrosive sublimate, an ounce and an half ; and of lime-water, one pound ; mix together for a cathartic.

*Or,*

TAKE of crude mercury, eight ounces ; and dissolve in ten ounces of the spirit of nitre. Add to this solution, six ounces of rectified spirit of wine for a cathartic, to be used not only for destroying gangrenous and sphacelated parts, but also for consuming hard and indurated flesh, if it is previously corrected by adding an equal quantity of water, and a little honey.

THE method of applying this efficacious remedy is to dip pledgets in it, with which we touch the gangrenous parts.

AFTER

AFTER having destroyed the sphacelated parts by caustics, we must procure the falling of the eschar they have produced, and bring on a suppuration of the flesh to which it adheres. For this purpose, we must use the *maturating* and *suppurating* medicines, specified in the chapter relating to the suppuration of *wounds*; or, we may employ the following preparations:

TAKE of the ointments of basilicon, and marsh-mallows, each four ounces; and of fresh butter, two ounces; mix up all for an ointment.

Or,

TAKE of basilicon, six ounces; and of the common potential cautery, dissolved in a little water, three drams; mix all together for an ointment.

Or,

TAKE of soft soap, and fresh butter, each four ounces; make into an ointment to be laid upon the dressings applied to the part affected.

HOWEVER as 'tis to be dreaded least a suppuration, without which the eschar cannot fall off,

off, should bring on a new inflammation of the wound, provided the use of caustics has not excited it, we must apply to the gangrenous part, and those adjacent a *defensive plaister*, composed of *crumb of bread and wine*, or of the meals of *lupines and bitter vetch*, or of *crumb of bread and milk*.

WE ought not, however, to mix with the *suppuratives* and *digestives* used in procuring the fall of the eschar, the *powders of myrrh, aloes, and wormwood*, according to the custom of the vulgar surgeons; for these powders render the eschar harder, and by that means retard the suppuration necessary to its fall.

If the application of *caustics* does not stop the progress of the gangrene, we must have recourse to the *actual cautery*, in order to destroy the mortified flesh. But if the gangrene has made a very considerable progress, and affected all the muscles of the part, the only thing to be done, is to cut off the member in the most proper place. After having duly examined the extent of the gangrene, we must perform the amputation with all expedition, lest the blood corrupted by the gangrene, by remaining too long in the wounded part, should communicate its bad quality to that which circulates in the adjacent parts,

parts, and occasion its dissolution, colliquation, or coagulation, two qualities directly opposite to each other, but which at the same time prove equally mortal when they happen in the blood.

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## CH A P. XI.

*Of the internal regimen, or method of treating wounded patients.*

**T**HE first intention to be pursued in the internal regimen and treatment of wounded patients, is to prevent the congestion of blood, and the inflammatory tumour to which the lips of the *wound* are subject; for of whatever nature a *wound* is, either the vessels have been cut, and recede from each other, or they have been dried, burnt, and, as it were, cauterized, in both which cases, the free circulation of the blood is hindered in their cavities, and this blood being able to go no farther, is accumulated in the lips of the *wound*, in a large quantity, because it is copiously propelled to the wounded parts. For this reason the physician ought carefully to prevent the equal, and much more the greater afflux of blood than usual

usual to the wounded parts. But as the humours are conveyed to the parts, in proportion to the velocity with which the heart propels them into the arteries, and the quantity of fluids the vessels contain, it is evident that in order to lessen their usual afflux to the parts, nothing else is requisite than to diminish the mass of blood, either by evacuation, or by retrenching, what is necessary to repair its continual losses. For this purpose we must bleed the patient with all expedition, and repeat the venesections which ought to be very copious, for three, four, or more times, unless a considerable hemorrhage has produced a sufficient depletion of the vessels.

In order to prevent the reparation of the loss continually sustained by the blood, we must keep the patient under a very strict regimen, and retrench as much of his usual nourishment as is necessary to diminish the blood, without exhausting his strength too much; since, in this case, gross and solid aliments form a thick chyle, and consequently a blood of the same kind, which is of course less disposed to dissipation, but, on the contrary, preserves its usual bulk and quantity. We must prohibit the use of all solid aliments to wounded patients, and procure as

great a fluidity of the blood as we possibly can, in order to favour its dissipation. This intention is answered by liquid aliments, such as broths prepared with flesh ; or, if it is impossible to refuse solid aliments to a patient, we may, besides broths, permit him to use some light panadas, or weak creams of rice, or new laid eggs, once or twice a day, at proper hours.

THE patient must by no means be permitted to use such things, as are capable of augmenting either the circulatory, or fermentative motion of the blood, and, by that means, of exciting inflammatory tumors in the wound. For this reason he ought to abstain from wine, and only drink *water impregnated with bread*, or the *decoctions of barley, maiden-hair, or mallow flowers*, which are liquors very proper to check and abate the too violent motion of the blood.

IN order to diminish the too copious afflux of the blood to the parts, 'tis not sufficient to have diminished its quantity, but we must also take proper measures to hinder the velocity of the contraction of the heart, and augmenting the violence and rapidity with which the blood passes thro' the arteries, from conveying, in the same space of time, a greater quantity of it towards the wounded part.

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For this reason we must have recourse to venesections, whenever we perceive that the force and number of the contractions of the heart are augmented.

BUT as the contraction of the heart is only accelerated, in proportion to the augmentation of the fermentative motion of the blood, all the parts of which, are subservient to the contraction of the heart, it is obvious, that when in *wounds*, the motion of this organ becomes more frequent and rapid, our principal intention ought to be, to moderate the fermentation of the blood, and the celerity of the fluid which produces the contraction of the heart.

HENCE, as the fermentation of the blood is only maintained by the equal proportion both of the quantity and size of the heterogeneous, and specially of the acid, volatile, and acrid parts, which encounter with each other in it, 'tis sufficiently obvious, that this fermentation will be the more violent, the more the saline parts are numerous, large, and of such a nature as briskly attack each other. Thus, in order to check this violent motion, whether in wounded, or other patients, we must either diminish the superfluous fermentative parts of the blood; or



take care that only such of them as ought to move be put in motion; or attenuate and divide them, if they are too large and bulky; or lastly, obtund and sheath them up, in such a manner, as that they cannot act upon each other.

THERE are various methods of answering the first of these four intentions; for we may evacuate the too loose saline parts, which abounding in the blood, excite too violent a fermentation in it, either by urine, transpiration, or stool, according as we employ either *diaphoretics*, *diuretics*, or *purgatives*. Thus, all these methods, or, at least one of them, must be used, in order to carry off the redundance of fermentative parts, with which the blood is impregnated. And as hot sudorifics, and diuretics, throw the blood into violent commotions, which effect is not produced by mild purgatives, we must, by these, carry off the superfluous saline parts of the blood. Among the medicines of this kind, are *senna*, *rhubarb*, *cassia*, *tamarinds*, the *infusion of pale roses*, and *syrup of peach flowers*; so that the milder purgatives are most proper to check the too violent, and frequent contractions of the heart.

If it should be asked, at what time it is proper to purge wounded patients, I answer, it may

may be done at all times, except when the symptoms are at their highest, that is, during the suppuration; because, at this time, the violence of the fermentation so confounds the saline parts with the other principles of the blood, that they cannot be disengaged without great difficulty; and granting that this should happen, and that these saline parts should be conveyed to the various emunctories, yet the rapidity of the blood's motion carries them off, and hinders their elimination by these excretory organs. For this reason we must daily and indiscriminately purge wounded patients, before the usual time of suppuration, taking care to have them blooded previously. We may also purge them after the suppuration is at an end, and in the very beginning of the disorder, when the fever and fermentation of the blood are not very violent, in order to carry off the heterogeneous parts, which might excite these two symptoms, provided the patient was plethoric before the reception of the wound. Wounded patients are also to be purged, when they are afflicted with a *diarrhæa*, a *delirium*, *convulsive motions*, or *excessive drowsiness*, in which last case, we use the strongest purgatives.

THE second of these intentions is answered by abstaining from every thing which can supply the blood with too large a quantity of fermentative parts, such as *wine, all spirituous liquors, too strong broths, and too heating aliments*; in a word, by abstaining from every thing capable of augmenting the motion of the humours, and more effectually disengaging the saline parts, which float in the lymph, and are obtunded by it.

BESIDES, as violent pains, by the agitations they produce in the nervous fluid, contribute to put the saline parts of the blood into motion, and thus to excite their fermentation, it is expedient for the prevention of this, to alleviate the pains felt in the wounded parts, which intention is excellently answered by *narcotics*, especially those obtained from *opium*, and among the rest *simple laudanum*, or the *extract of opium*, since, no medicines are more proper to appease pain, and the symptoms which generally attend it, such as *watchings, deliriums, and convulsions*. We ought not to be deterr'd from this practice, by the ill-grounded suspicions which the antients had, that remedies of this kind retarded the suppuration of *wounds*, and brought on a gangrene, since we are convinced  
from

from long experience, that the *extraët of opium* accelerates the suppuration of *wounds*, and renders it much less troublesome than it would otherwise be. Besides, *narcotics*, prudently administered, have often prevented a gangrene.

As for the third of these intentions, which consists in dividing the too gross saline molecules, which maintain the too violent fermentative motion of the blood, it is answered by such medicines as *dilute* and *attenuate* the humours; copious draughts of simple waters, or of weak decoctions of burnet and maiden-hair, are exceedingly proper for cooling the blood, and rendering it more fluid, especially the decoctions which by the volatile and saline parts, with which they are impregnated, divide the texture of the gross sulphureous parts contained in the blood, and by that means open a passage for the aqueous to dissolve the saline parts. Among the inciding and attenuating remedies, we must choose such as are proper to divide, and obtund the too gross and acid parts. Of this kind are most *absorbent substances*, such as *crab's eyes*, *diaphoretic antimony*, and *bezoar mineral*, or *volatile alkaline salts*, as *that of vipers*, *the salt and spirit of harts-horn*, and *the powder of vipers*. We ought never to use these remedies however, till  
proper

proper venesections and purgings have been made. We ought also to be very careful not to attribute the excessive fermentation of the blood to the grossness of its fermentative principles, when it depends upon the too great disengagement of these principles, which are no larger than in their natural state; for, in this case, we would have reason to repent the exhibition of *attenuating* and *stimulating* medicines, whereas we ought to have used such as *correct* and *incrassate*, which last answer the fourth intention, which is to embarrass the saline fermentative parts of the blood, either by remedies, which receive them into their pores, or by such as, in consequence of their viscosity, obtund and sheath them up. This intention is answered by *absorbents*, as *coral*, *crabs-eyes*, and *seald earth*; or by *incrassating* medicines, as *emulsions of the four cold seeds*, *linseed*, and *white poppy seeds*, decoctions of the roots of the *greater consound marsh-mallows*, and the *flowers of mallows*, to which we may add the *creams of rice and barley*, and *broths prepared with calfs feet*.

WHEN the fever is appeased, and the lips of the wound cease to suppurate, we must, in order to favour the generation of flesh, and the formation

formation of a laudable cicatrix, dissipate the serum which abounds in the mass of blood, and correct the acrimony of the salts, disengaged during the treatment of the wound. One of these ends is obtained by *sudorific decoctions*, especially *those of china and sarsaparilla*, and the other by the long continued use of *whey*, or *milk*.

BESIDES, in the treatment of wounds, we ought to have a great regard to the digestion of the aliments, so that acid crudities may not be generated in the stomach; for which reason wounded patients may take, once or twice a day, four ounces of the *decoction of peruvian bark*; to which is added a proper quantity of *coral*, or *crabs eyes*. In persons of a cold constitution, the *decoctions of wormwood, germander, and the lesser centaury* are very proper; for we must always have a singular regard to the peculiar constitutions of wounded patients.

As we have shewn that no medicine is of itself capable of generating new flesh, which is entirely the work of nature, 'tis evident, that remedies cannot contribute to the production of flesh, but in so far as they remove all obstacles to its vegetation. Now one of the most considerable of these obstacles is the lymph discharged



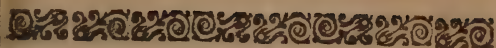
charged into the cavity of the wound, which corrupting and becoming acrid by its continuance, corrodes and destroys the flesh, in proportion as it is formed, and opens the extremely tender and delicate vessels; for which reason no substances are more proper to cleanse this thick and viscid lymph, and carry off these corrosive salts, than *salino-aqueous deterfive medicines*. Let us therefore conclude, that

*When the suppuration of wounds is terminated, aqueous remedies rendered deterfive by means of salts, are much more proper for procuring a cicatrix, than oleous sarcotics, and other medicines composed of pinguious substances.*

F I N I S.







THE FIRST  
DISSERTATION  
Medico-Chirurgical;

O R,

*An* ESSAY *on the* Suppuration  
*of the* soft Parts.

By M. FIZES, *Professor of Physic, in*  
*the University of Montpellier.*



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THE FIRST  
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An ESSAY on the suppuration of the soft  
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THE design of the present dissertation, is accurately to examine and consider what most frequently happens in the human body, when some vessels, especially those which contain blood, have suffered a solution of continuity; and what are the means which nature always employ'd in her own preservation, makes use of on such occasions, in order to deliver herself from every thing which may be prejudicial to her, and restore the divided parts to their natural union. This enquiry is highly necessary, and calls for the greatest care and attention of physicians and surgeons; because, for the most part, 'tis hardly possible that the substance of the parts torn in many species of tumors, and cut or contus'd in *wounds*, should be repair'd and regenerated without this preliminary work of nature; in a word, we observe many tumors which nature terminates by a suppuration, with

a design, no doubt, that by the formation of pus, the part being freed from that, which for sometime had interrupted its functions, may restore itself to its natural state; and that the particles which form'd its texture, and had been separated from each other, may be again brought into contact and united. We also observe, that in various species of *wounds*, the re-union is almost never made 'till they have suppurated.

BUT there are great varieties in suppuration; since this work of nature presents us with as many differences as are observable, not only in the structure of the solid parts, and the quality of the fluids, but also in the manner in which the suppurating parts have been torn, and in the method used in treating them. Art then must vary the succours, of which nature, sometimes incapable of assisting herself, stands in need, in order to begin and finish a suppuration.

WE shall therefore briefly treat of this subject, and make it our principal business to explain the mechanism of suppuration in the soft parts, which will greatly contribute to illustrate not only the theory, but also the treatment and cure of tumors, *wounds*, and ulcers.

EVERY person is acquainted with the sensible qualities of that fluid, which is never found in the human body in its natural state, and which

we call *pus*. By this word we generally understand a fluid of a middling consistence, which resembles jelly, is vici'd, whitish, and form'd in the solid parts by the stagnation of extravasated blood; but the manner in which this *pus* is produced, which we call *suppuration*, is not so clear and evident, but that it deserves a careful and accurate examination.

WE shall not confine our researches to this enquiry alone, but in order to render the history of suppuration more compleat, shall consider the symptoms which accompany it when it is commenced. Then we shall explain what things are capable, either of hindering its formation, stopping its course, or producing any changes in it. And lastly, we shall specify those things which are proper, either to excite it, or favour its progress.

## PROPOSITION I.

*A suppuration never happens, but in such parts as are live.*

THIS is sufficiently certain, since every suppurating part has both heat and sensation, even in a greater degree than in the natural state; for, on this occasion, 'tis extremely painful and burning: besides, we have no observations either of a

medicinal, or chirurgical nature, which prove, that a part entirely mortified, as in a sphacelus, has ever come to a suppuration; and if in such cases we have observ'd a discharge of purulent matter, yet this never happens unless the mortified part is entirely separated from such as are live, which furnish this pus; besides, no person ever saw pus form'd in a putrifying carcase.

## PROPOSITION II.

*A suppuration never happens in the substance of any part, unless small blood vessels are broken in that part.*

THIS proposition implies two things, the first of which is, that pus is not form'd in the cavities of the blood vessels, so long as they are sound and entire, and the second, that it is not sufficient for the formation of pus, that any sorts of vessels be indifferently broken, but 'tis absolutely necessary for this purpose, that small blood vessels should be ruptured. The first part of this proposition is demonstrated by what is daily observ'd in practice, namely, that the suppuration of a part is always preceeded by a dilaceration of the substance of that part, produc'd either by internal or external causes; and that

we

we have hitherto no observation evincing the formation of pus in a blood vessel, when sound and entire.

THE second part of the proposition is sufficiently prov'd by the following reasons; 'tis certain, that in the composition of the parts, there are vessels of different natures, so that some of these may break rather than others. Now it has been observ'd, that a suppuration was never brought on in a *wound* whose blood vessels remain'd entire, tho' the vessels of any other species were divided; thus when the lymphatic, pinguiferous, or neurolymphatic vessels, which are distributed thro' the whole body are broken, such a rupture is succeeded by an accumulation of serum, and sometimes by hard tumors without pain, which remain long in this state of insensibility and hardness; and most frequently by undigested tumors, full of a thick matter which resembles suet, and is always the same without any action, for which reason they are call'd *cold tumors*, but pus was never observ'd to be form'd in these kinds of tumors.

IN like manner, a suppuration is never observ'd to happen without a previous discharge of blood. For this reason, parts abounding with blood, often and easily come to a suppuration; whereas



whereas the parts, which contain little or no blood, suppurate rarely, and with difficulty ; Hence it is, that suppuration is one of the necessary consequences only of inflammatory tumors, such as *phlegmon* and *erysipelas*. Hence it also happens, that *scirrhus* and *œdematous tumors* never terminate by suppuration, nor discover the least appearance of pus, unless the blood, by stopping in the parts which are either contiguous to these tumors, or in some measure forms them, has brought on a previous inflammation. Hence also arises the common proverb among surgeons, that *pus follows blood*.

### PROPOSITION III.

*A large quantity of blood discharged and accumulated in a considerable cavity, is not converted into pus.*

WE daily observe these kinds of extravasations and collections of blood, in some considerable cavity, as the abdomen, the breast, the head, the urinary bladder, and the uterus ; or in some large interstices of the external parts, as in a spurious aneurysm, and many other cases : But on such occasions the serum of the blood thus discharg'd, separates itself

self from the rest, and being no longer distributed among the other parts, whose fluidity depended upon it, these other parts become grumous and coagulated, after which they are corrupted, and by their long stay chang'd into a cadaverous liquor call'd *sanies*, which generally resembles a kind of lixivium, and is of an highly foetid and abominable smell. This frequently happens to the blood discharg'd and retain'd in the uterus, in consequence of the too great constriction of its internal orifice. It sometimes happens however, that the blood thus accumulated, retains its fluidity for a considerable time, thus in *wounds* of the breast inflicted several days before, I have sometimes seen sufficiently fluid and florid blood evacuated by a canula, after having perform'd the operation for the *empyema*. In opening some carcases, I have also observ'd a sufficiently fluid, and well-coloured blood, extravasated in the head.

BUT none of the cases in which the extravasated blood is converted into pus, are comprehended in the present proposition; and if we have at any time observed, that the blood collected in any considerable cavity, was mixed with a little pus, this is by no means a sufficient reason for our believing, that a part of  
this

this blood was changed into pus; for, upon a more accurate examination, we find that this circumstance is occasioned by the suppuration of some of the adjacent parts. A satisfactory proof of what I advance, is that, whenever the blood evacuated by the operation for the empyema, is mixed with pus, there is either in the *pleura, mediastinum, or surface of the lungs*, an abscess, or ulcer, the purulent matter of which is discharged into the cavity of the breast. This is sufficiently attested by the observations of the most skilful physicians and surgeons.

#### PROPOSITION IV.

*It sometimes happens, that tho' there are blood vessels ruptured, yet a small quantity of blood being discharged into the substance of the part, no suppuration is by that means excited.*

WHAT happens in *ecchymoses*, is a sufficient demonstration of this proposition; for on these occasions, the blood is discharg'd into the texture of the part, but this blood is not fluctuating and collected into one place; since it is dispersed thro' the whole extent of the part, and makes it appear of a deep red or blackish colour. This colour be-

comes

comes gradually paler and paler, by assuming different shades, 'till the part has regained its natural colour, which effect is produced by the *insensible resolution* of the extravasated blood, which gradually enters the current of the circulation without exciting any suppuration.

### COROLLARY.

FROM the two preceding propositions it follows, that the extravasated blood cannot convert itself into pus, tho' it should be inspissated and disposed to putrefaction by the vapours emitted from the adjacent parts, to which it is exposed; for it is sufficiently obvious, that the production of a suppuration, requires other causes and conditions.

### PROPOSITION V.

*To explain the mechanism, by which pus is formed in a live soft part, the sanguiferous, and other vessels, composing the texture of which have been broken.*

AMONG so many sanguiferous, and other vessels, which form the substance of the soft parts of the human body, whether internal, as the viscera, or external, as the muscles

muscles and teguments ; nothing is more common than to see some of these vessels break, in such a manner, that their intimate texture is by this means lacerated, without being entirely destroyed and corrupted. The causes of such a rupture, or breaking of the vessels, are either internal or external. The most common internal cause, is the excessive distension of the coats of the vessels, produced by the humours they contain ; for it more rarely happens that the acrimony of the humours corrodes and lacerates these coats. The external causes are the action of various instruments, whether contusing, cutting, piercing, or, in any other manner capable of tearing the parts ; or, the application of corrosive and cauterizing substances. 'Tis sufficiently obvious, that all these causes act by destroying the continuity of the vessels of the part to which they are applied ; so that their extremities, which when united, formed one continued canal or duct, remain open, gaping, and divided into various shreds.

LET us therefore examine in what manner that pus is generated, with which a part that has suffered such a solution of continuity is afterwards moistened.

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As soon as a rupture is made in the vessels of any part, the contained fluids at first discharge themselves copiously, whereas they afterwards fall drop by drop, till the evacuation is insensibly, and totally stopt. But after this, the circumference of the part cut, or divided, is generally inflated and tumified: There is also in it an intense heat, and a quick sensation; a painful pulsation accompanied with a sense of heat, and very often of burning. These symptoms are sometimes accompanied with shiverings, and always with a fever. The lips of the wound are but a little moist, and sometimes entirely dry and parched. But when these symptoms are diminished, the inflation of the lips subsides, and they appear moistened with a new whitish humour, moderately thick, and gently viscid, which we call *pus*. When the part affected is in this last condition, we say, that it is ulcerated. These are the phenomena, which generally precede, and accompany the formation of pus.

If we carefully attend to what happens, both in the vessels and humours of a part about to suppurate, it will be no hard task to discover how this purulent liquor is form'd. In order therefore to illustrate the matter more effectually,

ally, we shall examine what passes in a *wound*, inflicted with a cutting instrument.

'Tis to be observed then, that in the lips, and all the surface of such a *wound*, the vessels are in two different states ; for some are cut, and permit the circulating blood to flow from their orifices, whilst others, which have escaped the instrument, remain entire, and maintain the life of the wounded part. It must therefore necessarily happen, that as soon as a *wound* is made, the liquors contained in the prodigious number of small broken vessels, which open into the cavity of the *wound*, must be promiscuously discharged. And as among all these liquors, the largest in quantity is the blood, both on account of the larger diameters, and greater number of the blood vessels ; and because the blood, as is demonstrable from physiology, circulates with greater velocity, than any other humour in the human body, it follows, that such a *wound* must, at first, appear full of almost pure blood.

THIS hemorrhage continues so long as the ruptured vessels are not absolutely empty, and their sides preserve a sufficient degree of tension and elasticity, to convey into the cavity of the *wound*, either the fluids they contain, or those propelled



propelled into them. But as these fluids are easily discharged into the *wound*, because, at first, the opened vessels offer them no resistance; hence it follows, that in the first moments, the blood must be expressed with a velocity so great, that the motion of the subsequent fluids, cannot often equal it, on account of the resistance they meet with in the curvatures of the divided vessels. For this reason, the rapid and copious discharge of blood, will be succeeded by a depletion of the small broken vessels. On the other hand, the course of the fluids subsisting still in the sound small vessels, which enter the texture of the lips of the *wound*, it is evident, that they must be dilated, and possess a larger space, because the depletion of the extremities of the ruptured vessels, totally removes the force by which they were dilated. Hence 'tis obvious, that the compression of the ruptured vessels will, at first, in some measure, favour the discharge of the humours, by the lips of the *wound*; and that the dilatation of the sound vessels, augmenting gradually, will so compress, and brace up the ruptured vessels, that the hemorrhage will at last cease totally. The extremities of the ruptured vessels are principally compressed, as being weaker in that part, in

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consequence

consequence of the dilaceration, than in any other. Besides, what contributes still farther to stop the hemorrhage, is that the ruptured vessels, by the contraction of their longitudinal fibres, retire into the substance of the part, as usually happens in all cut vessels; so that the orifices of the vessels, which have been lacerated, are concealed in the interstices, between the sound vessels.

ANOTHER reason why hemorrhages stop in wounds is, because, as soon as the velocity with which the blood was first discharged is diminished, the circulatory fibres, which remained sound, and which are nearest to the lacerated part, being no longer dilated by the afflux of the blood, naturally contract themselves, and begin to constrict the extremities of the divided vessels. To all these considerations we must add, that the fluids which fall drop by drop, being no longer agitated by the progressive motion on which life depends, will, when they arrive at the shreds of the ruptured vessels, lose their natural fluidity, and be coagulated; which effect is in a great measure also produc'd by the action of the air.

WHEN therefore the discharge of the fluids into the cavity of the wound is diminish'd, we

may easily conceive, that the extremities of the ruptured vessels are stopt, constricted, and compressed: But, since as after the infliction of the wound, the small trunks of the arterial and lymphatic vessels, which are not empty, and which are distributed in the lips of the wound, are still the same, and equally numerous, the blood and lymph will continue to arrive in the same quantity, and with equal velocity in the lips of the wound; but as they cannot be received into the ruptured vessels, whose extremities are contracted, with the same ease they were before, it necessarily follows, that the ordinary circulation, being by this means destroyed and interrupted, not only the ruptured vessels must be considerably dilated at their origins, but also, that the fluids must be determined in greater quantities than usual into the sound vessels; and even that this redundant quantity must be proportioned to that which cannot in a determin'd space of time, pass thro' the ruptur'd vessels, on account of the resistance it meets in their extremities. Besides, when the entire vessels thus suddenly receive this load of humours, they are distended, and almost overpowered by it; and the recurrent vessels not allowing the humours to return with the same

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velocity with which they arrived at the *wound*, it happens that both the ruptured and entire vessels are greatly inflated, and infarcted with blood, the fluid which most abounds in the part. Hence arise the tumor, the redness, the heat, and the uneasiness in the lips of the *wound*. Hence also arises the painful pulsation, accompanied with a sense of heat, perceived in the wounded part; for at every contraction of the heart, the small arteries before afflicted with violent pain, by the great distension of their cotes by the blood receive a new quantity of blood, which by dilating them still more, renders the pain intolerable, by the irritation it occasions. When all these symptoms are present, the vessels in the lips of the *wound* are extremely distended, the fibres are strongly and quickly agitated, and all the humours, especially the blood, being embarrassed in their course, form congestions, accompanied with heat and inflammation, which greatly affect the part.

THE symptoms of a *wound* are not confined to the wounded part alone, since the whole body is also affected; for the patient is sometimes seized with shiverings and tremblings, which agitate all his limbs, and generally an acute fever burns him internally. In a word,

It can hardly happen that membranous parts should be distended, and irritated, without producing a violent agitation of the nervous fibres, in consequence of which, the whole body will, by means of *sympathy*, be agitated and tremble, the patient, in the mean time, perceiving an universal disorder in the animal œconomy. The more exquisite the sensation of the wounded part is, that is, the more numerous and tense the nervous fibres are, which enter its texture, the more violent will the shocks of the nervous system be ; and all other circumstances being equal, they will also be the more considerable, the larger the wounded part is. Besides, if the small vessels, and fibres of the part wounded, are stretched, corrugated, and in some measure convulsed, either by the peccancy of the blood, or the particular nature of the instrument with which the *wound* is inflicted, so that the patient is afflicted with intense pain ; this will greatly contribute to augment the agitation of the nerves distributed to the wounded part, as we may daily observe in *wounds*, whose lips are *erysipelatose*, as also in *burns*, and *wounds made by caustics*. These violent agitations of the nerves of a wounded part, in consequence of the continuity of the whole nervous system,

are communicated to the nerves dispersed thro' the whole body, which are so irregularly agitated by them, that they produce here and there, in the fleshy and membranous fibres, crispations, and contractions equally irregular; so that the patient perceives, in different parts of his body, tremblings which are sometimes accompanied with a sense of cold, because the vibrations of the fibres, which shrink and retire unequally thro' all the body, are like those usually produced by the application of cold substances. Hence it is, that in large wounds, those made by corrosives, those in parts of exquisite sensation, or inflamed, in burns, and in other similar cases, the suppuration is sometimes preceded by *horrors* and *shiverings* all over the body. At this time the patient perceives a kind of cold, which is not very violent; but this is only an apparent cold, since the body is not really so. These *horrors* resemble those we sometimes feel towards the end of a discharge of the urine; or, when we take some medicine disagreeable to the taste; or, suffer some surgical operation. It sometimes happens, however, that when in a suppuration the patient shivers, the body is actually cold to the touch, but this only happens when the pus is completely



completely formed, and ready to be discharged by the lips of the *wound*. We shall in the subsequent proposition explain how this happens.

As *shiverings* are the fore-runners of a suppuration, in large and painful *wounds*, so a fever generally precedes, and accompanies the formation of pus in *wounds* of this kind; for when the pain, and heat of the wounded part, denote that it is ready to enter into a suppuration, the patient begins to feel shiverings all over his body, as we have already observed. Then he becomes gradually hotter and hotter, 'till an acute fever is excited. The true cause of this fever, is nothing else but the painful vibration of the nervous fibres of the suppurating part, which communicating with all the other filaments of the nerves, on account of their continuity, at least, with those in the brain, determine the nervous fluid, to flow copiously into their cavities, and produce a greater tension and rigidity in the nervous system. By this means there is produced an augmentation of force in the heart, arteries, and texture of all the viscera. Hence the solids act more forcibly on the blood, by which means it circulates with greater velocity, and the humours are more rarified. This accounts for the frequent  
and



and full pulse, the burning heat of the whole body, and the acute fever. But what still augments the fever, is that the over-heated blood in the lips of the *wound*, whatever difficulty it finds to reurn by the veins, yet does so, and mixing with the whole mass of blood, augments the motion of its molecules, and, consequently, disposes it to acquire a greater heat and rarefaction.

WHILE the solids, and fluids, act thus reciprocally on each other, in the suppurating part, the ruptured vessels hardly make the least oscillation; for, as on one hand they want a fixed stay, or support, in consequence of the laceration of their extremitities, and, as on the other hand, they have, in consequence of the retraction of their longitudinal fibres, lost that strong tension and elasticity which enabled them to re-act on the fluids they receive, we may look upon them as useless, and almost mortified vessels in the lips of a *wound*. However, as they are greatly inflated in their origins, by the fluids which their excretory vessels force into their cavities; as they hardly act upon these fluids, and as the sound blood vessels, in the adjacent parts, beat violently on the contiguous parts, it must necessarily follow, that those brisk pulsations, and dilatations,

dilatations, carried to excess, must alternately compress the ruptured vessels, and so constrict them, that they make an effort to expel the fluid they contain. But this fluid is become thick by its continuance, and is consequently in an improper state for being discharged. Besides, the lacerated extremities of the vessels are so constricted, that they make a great resistance to it, and the vessels which continually force fluids into those which are ruptured, still more powerfully oppose its reflux. 'Tis, therefore, only by a number of reiterated actions of the sound, upon the ruptured vessels, that the wounded part can be freed from this liquor, absolutely incapable of returning into the course of the circulation. Tho' this liquor is thus agitated by these compressions, and repeated pulsations, yet it remains without any change of place, in which respect 'tis quite different from what it was in its natural state, when the immediate action of the vessels which contained it, made it flow freely thro' their cavities, which shews us the great difference between the fluids in the ruptured vessels of a suppurating part, and those circulating in sound and entire vessels. 'Tis not therefore surprizing that the suppurative motion should produce a new and particular

particular liquor, which is not to be found in the body when in a natural state; for in this last case, the blood being propelled, gently, and equably, by the elasticity of the blood vessels, whose coats immediately touch it, its red globules being separated from each other, swim freely with the fibrous parts, in a mucilaginous and aqueous fluid, so that it easily passes thro' the most minute blood vessels. But, in the work of suppuration, the blood stagnates at the part from whence the ruptured vessels are conveyed, for which reason the red globules, and fibrous part are coagulated, and having expressed the most fluid serum from their interstices, this serum transpires thro' the extremities of the ruptured vessels, or is dissipated by the heat of the part; so that the red globules uniting into one mass with the fibrous parts, which are mixed with them, remain embarrassed among the mucilaginous parts of the blood. 'Tis on this occasion, that the sound vessels acting on this mass of coagulated globules, which have entirely lost their fluidity, compress, attenuate, and so break its molecules, that they convert it into an homogenous liquor, which being afterwards intimately mixed, by means of these pulsations, with  
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the fibrous, lymphatic, and mucilaginous parts, which are naturally white, entirely loses its red colour, and becomes a fluid considerably thick, and of a fordid white colour, called *pus*, and, which gradually acquiring more fluidity, in proportion as the action of the sound vessels continues to divide it, is at last expressed into the *wound* thro' the extremities of the ruptur'd vessels. This expression of the *pus* into the *wound* is easily made, because the lacerated extremities of the vessels being, soon after the reception of the *wound*, entirely deprived of life, easily yield to the efforts of the sound vessels to dilate them. Besides, the extremities of the vessels softened by the mortifications, are separated, confound themselves in the lips of a *wound* with the *pus*, and contribute to give it a white colour, which as being solid parts, they have themselves. What happens in the amputations of limbs, convinces us, that the extremities of ruptured vessels are thus separated. There is no manner of doubt, but these extremities are really lacerated in ruptures and contusions, as also in *wounds* made with cutting instruments; for however good and sharp the edge of these instruments may be, yet when examined with a microscope, it appears rough and

and unequal, and consequently cannot cut the parts without tearing them. The lymph, a whitish thick liquor, which oozes from the orifices of the ruptured lymphatic, or neuro-lymphatic vessels, and which is expressed by the pulsation of the sound vessels, is also mixed with the pus in the lips of a *wound*; for every thing that happens to the blood vessels, also happens to those of the lymphatic kind, when torn; that is, after the first discharge, which happens immediately after the reception of the *wound*, the lymph stagnates in the ruptured lymphatics, by the same mechanism that the blood does in the blood vessels. It is also inspissated, and coagulated, afterwards violently agitated, and lastly, determined to flow through the orifices of its lacerated vessels. As for the liquor discharged from the nervous filaments, 'tis so small in quantity that it can hardly be said to enter the composition of the pus.

WE have therefore demonstrated, that the pus is a mixture of various ingredients in the inequalities of the surface of a *wound*, namely blood, which has lost its redness, and is the largest ingredient in the mixture, a little viscid lymphatic juice, and the extremities of the lacerated vessels which fall off in small parcels,  
and

and are converted into a soft and whitish kind of glew. Thus I have examined pus, in all the degrees of its formation, and shewn that it oozes from an infinite number of small orifices, in all the surface of the *wound*.

## C O R O L L A R I E S.

### I.

THE efficient cause of a suppuration is the oscillatory motion of the sound vessels, especially of the sanguiferous kind, which being more distended, and beating more frequently than usual, when they dilate themselves, strongly compress, and agitate the ruptured vessels, which are full of a stagnant fluid; so that 'tis easy to conceive, that in a suppurating part, there must be an inflammation, or, at least, an intense heat.

THE blood and lymph becoming stagnant in the ruptured vessels, and even the extremities of these vessels, constitute the pus.

THESE three substances are really destined for *mortification*; for the blood and lymph being placed without the bounds of the circulation, are no longer subject to the same laws; and the lacerated extremities of the vessels hav-



ing lost their pulsatory motion, are no longer proper to transmit any fluids. All the efforts of nature in a suppuration, only tend to deliver herself, and separate from the live parts, this noxious mixture. By *nature*, on such occasions, we mean no more than an increase, and greater activity of the vital motion of the vessels of a live, and suppurating part. Such is the efficient cause of a suppuration, such its matter, and such the end and design of nature in performing this work.

## II.

THE true seat of a suppuration is only to be sought for in ruptured vessels, and never happens any where else; since we find neither a cause capable of producing it, nor matter proper for the formation of pus in any other part. Hence it is, that when the blood is once totally extravasated, whether it is copiously collected in some cavity, or dispersed through the substance of the soft parts, as in ecchymoses, (see the corollary of prop. 3. and 4.) or whether it is lodged in the interstice, between the lips of the *wound*, it is not chang'd into pus; in a word, live parts can only suppurate.



SOME time ago I saw a gentleman of *mont-pelier*, who had for some time before been tormented with a fixed pain of his stomach, accompanied with a violent hiccup, a tumor situated in the *epigastric region*, and excessive anxieties. This pain succeeded a malignant fever, of which he had been cured. But he was freed from all these symptoms by a violent vomiting, which happened when no such thing was expected, and, by which, he discharged with violence, a blackish and bloody sanies, highly foetid, and in a large quantity, without any mixture of pus, and with which his stools were tainted for some days. 'Tis therefore obvious, from this observation, that the blood which had long remained in the coats of the stomach, was not converted into pus, tho' it was extravasated. 'Tis also obvious, that tho' the part had suffered a solution of continuity, yet it came not to a supuration, because the fluids found no hindrance to circulate thro' the sound vessels; for 'tis to be observed, that in the whole course of this cure, I discovered no signs of an inflammation of the stomach.

SOME abettors of the opposite doctrine, support their opinion by the authority of *Hippocrates*,

*crates*, who in the twentieth aphorism of the sixth section, tells us, “ That when blood is discharged into the cavity of the abdomen, it must necessarily be converted into pus.” But experience is quite contrary to this doctrine, as *Galen* very well knew ; for, says he, “ *Hippocrates* did not, in this passage, mean a suppuration, properly so called, but only intended to insinuate, that the blood was changed into a kind of sanies, or corruption ; or had its natural qualities altered.” *Hieronymus Mercurialis*, in his commentary on this aphorism, relates many examples which destroy this notion of *Hippocrates*.

SOME may perhaps say, if a large quantity of blood collected into one mass, is not changed into pus, because it is no longer exposed to the pulsations of every vessel in particular, and, because it proves too great a resistance to them ; or, if in an ecchymosis, the blood which is divided into small molecules dispersed thro’ all the extent of the part, is submitted to the continual, and infinite vibrations of the vessels which touch it, and proves but a small resistance to them, consequently the parts, in which there is an ecchymosis, ought to come to a suppuration. The persons who reason in this manner

manner do not advert, that in the parts where there is an ecchymosis, there are only very few blood-vessels broken, and that the blood is by no means lodged in these vessels, but freely discharged from their cavities, into the interstices of the parts. 'Tis true, indeed, that the particles of the blood thus dispersed, are in some measure agitated by the motion of the adjacent parts; but as they are not included in little vessels, as in so many sacks, they are not compressed sufficiently, and in an infinite number of points, by the reiterated pulsations of the adjacent vessels; but yielding easily to the impression of these pulsations, whose efforts are extended every where indifferently, and consequently not being condensed, and united into one mass, they are conveyed into the interstices of the parts without any change of form, extend themselves, are separated from each other, and dissipated. Hence it is, that ecchymoses daily acquire a fainter colour, 'till they at last totally disappear, by the transpiration of the blood which formed them. But if the substance of a part, where there is an *ecchymosis*, has been violently contused, so that the blood-vessels have been considerably dilacerated, and confounded with each other, in this case,

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there will not only be blood discharged into the interstices of the fibres, but also a portion of that blood will be retained in the shattered and dilacerated vessels, and incommoding the wounded part by its presence; will excite a stronger pulsation in the sound adjacent vessels, which acting upon the blood thus stagnant, will convert it into pus, by which means, the part where there is an ecchymosis, will come to a suppuration. The work of suppuration is performed in the suppurating part, which throws out every thing prejudicial to it. These are the boundaries, and this the end of suppuration.

### III.

THE blood is not changed into pus, in sound vessels, however, much obstructed; (see prop. 2.) for the blood thus congested in the vessels, has either preserved some degree of circulation, or is entirely stagnant. In the former of these cases, it is propelled by the proper motion of the vessels which contain it, which differs greatly from the external pressure made by the dilatation of contiguous vessels upon a stagnant fluid. For this reason, blood in the state we have now describ'd, wants the conditions

conditions necessary, and an efficient cause capable of transforming it into pus; and provided it but a little recovers its fluidity, it soon resumes its ordinary course, without in the least injuring the vessels in which it had stagnated. Thus parts, where there are congestions of humours, are sometimes cured by *resolution*.

IN the second case, that is, when the blood is absolutely stagnant in sound vessels, the part is so oppressed by its bulk, that the principle of life is almost entirely extinguished in it, and the efficient cause of suppuration can by no means act. Thus the part putrifies, and is soon after seized with a gangrene or sphacelus.

IF, however, we suppose, that the blood is obstructed in any vessels, in such a manner, that, tho' it is become incapable of afterwards circulating in their cavities, it yet preserves a free passage into the adjacent vessels, and if the principle of life still continues with vigour to exercise its functions in the part, then the obstructed vessels being extremely distended, receiving continually fresh fluids, and being agitated and compressed by the action of the sound vessels, will soon break, and this rupture will be succeeded by a suppuration, and an *abscess* form'd.

WE are not however to imagine, that a suppuration would happen, if vessels totally obstructed should so strongly resist the action of the sound vessels, which compress them by their dilatation, and furnish them continually with fluids, so strongly as not to be broken by them, but remain entire; for in this case, the same force which would hinder the augmentation of the obstruction sufficiently to break the vessels, and defend them from the effect which might be produced by the pulsation of the sound vessels, would by the laws of mechanics also hinder the blood forming this obstruction, from being agitated and attenuated by these pulsations. The reason why in such a case the humour remains stagnant, is the inspissation and induration of the mucilaginous part of the blood, contracted in the capillary vessels, which does not allow new fluids to arrive, in order to distend extraordinarily the coats of the obstructed vessels, and which, by its firmness and solidity, renders the pulsations of the adjacent vessels useless; for which reason, instead of a suppuration, a schirrus will be formed.



## IV.

BLOOD is not transformed into pus in considerable vessels when ruptured; for it flows continually from such vessels, both on account of the largeness of their orifices, and the force with which they contract themselves. But if we stop the hemorrhage by closing the extremities of the opened vessels, either by ligature, or any other method, then the blood does not remain in these clos'd extremities, but goes off into the collateral ramifications, whose cavities are pervious. Or if the blood should be accumulated in the divided vessels, the pulsations of the adjacent vessels will hardly produce the smallest change in it; for such a column of blood, has so small a surface on account of its solidity, that the compression suffered by it, cannot produce in it the same alteration it would produce in liquors, stagnating in the capillary vessels which present a larger surface on account of their diameters, than large vessels as is demonstrable by geometry.



## V.

WHAT we have hitherto said on the formation of pus in *wounds* made by incision, is also observed in the suppurations which happen in various parts. Thus, for instance, in contused parts, when suppurating, there are some vessels shatter'd and bruis'd, whilst others remain sound and entire; and the blood is congested as well in the former, as in the latter. This then is at once the efficient cause of a suppuration; and the matter proper for the formation of pus. In like manner, in the parts where some internal cause excites a suppuration, the discharge of the liquors proves that there are vessels broken; the life preserved in these parts, denotes that there are others preserved sound and entire; and the tumour, heat, and pain, are certain signs of the distention of these vessels by means of the blood. This is precisely the whole of what passes in the suppuration of a *phlegmon* and *erysipelas*.

## VI.

THE more vessels are broken in a part (provided life subsists entirely in that part) the  
more

more they are lacerated and confounded with each other; the more easy it also is for the humours to stop in great abundance in such vessels, in order to be converted into pus, and the greater is the quantity of that putrid whitish liquor into which the shatter'd vessels are reduced, in consequence of which, the suppuration is proportionably more copious. Now in contusions the vessels are extremely bruise'd, shatter'd, and as it were ground. The like holds true in *burns* and *wounds* made by caustics, whereas in incisions the division of the small vessels is made in one single direction. It is not therefore surprising that *burns* and *wounds* made by contusion or fire-arms, should suppurate much more than incisions. Thus when we incline that parts should suppurate copiously, we ought to open them with a caustic, rather than with the bistory.

## VII.

As the vessels cut in incisions are divided in one direction; as they are also little lacerated and preserve their natural situation, it is evident that the blood and humours will, for some time, flow from them copiously and easily.

easily. But if the hemorrhage is so copious, as to produce so great a vacuity in the ruptur'd vessels, that a further discharge is not dreaded; or if they obstruct the part, nothing either troublesome or extraordinary will happen in the sound vessels. For this reason the ruptured vessels which are empty, will be only compressed by those which are full, and their cavities will be so obliterated, that nature will make no effort to excite a suppuration; so that the part will be speedily cicatrized in the manner which we shall explain in the subsequent proposition. These things sometimes happen in incisions of the muscular parts, which speedily re-unite without a suppuration; but this does not happen, unless the liquors have been either copiously discharged of themselves, or suck'd out for fear of hurting the part by their bulk, or unless the margins of the *wound* have been rubbed with some oil or balsam, in order to defend them from the contact of the air. By this method the opened vessels are evacuated collapse, and have their sides insensibly united by the compression produced by the dilatation of the full vessels, and the wound is soon cured without any troublesome symptom.

Thus

Thus when blood-vessels break in some of the viscera, the copious hemorrhage which survenes, hindering the blood from incommoding the part by its accumulation in it, there is no suppuration made, and the lips of the wound are speedily re-united.

## VIII.

CONTUSIONS, wounds made by caustics, and burns, never cicatrise till after suppuration; for in all these species of wounds, the minute vessels are so broken, lacerated, confounded, and folded in different manners, that the hemorrhage from them is but very inconsiderable; in consequence of which they never become entirely empty, but, on the contrary, the fluids are accumulated in their cavities, which produces the obstruction and tension of the sound vessels, and consequently a suppuration. Besides, since in the present case, the shreds of the lacerated vessels are very numerous, and reduced to a corrupted humour too copious to be dissipated by transpiration, this also contributes to the formation of pus, which does not happen in incisions, in consequence of the small number of lacerated vessels.

## IX.

SINCE 'tis obvious from the first proposition, that the principle of life subsists in the whole of a suppurating part ; and since we observe, that a part which has suffered a solution of continuity, re-unites after suppuration, and has the exercise of all its usual functions restored, I am of opinion, that we ought not to look upon this vital principle as passive in the work of suppuration, and admit a *putrefaction*, or *particular fermentation*, as the only agent in the formation of pus. There is therefore no occasion to imagine with *Doleus*, and other chymists, that the extravasated blood is corrupted in the same manner with wine drawn from an hoghead, and, that afterward becoming acid, it is transformed into pus, especially since nature demonstrates to us, that pus is never formed without the concurrence of the action of the vital principle, however great a tendency the blood has to become corrupted or vapid, or enter into a fermentation. (*See the corollaries of propositions three and four, and the second corollary of the preceding proposition*). 'Tis in this manner, that the extravasated blood, whether in a small quantity, as in *ecchymoses*, and in the space between the lips of

of a wound, or in great abundance, as in considerable hemorrhages, becomes vapid and subject to putrefaction. 'Tis also in this manner, that the blood in sphacelated parts, or when it has been long retained in the cavity of the uterus, is so altered by the intestine, putrefactive, and fermentative motion, which survenes, that it afterwards appears under the form of an highly foetid lixivium. And it was in this manner, the blood was changed in the coats of the stomach, in the history I have before related. But the reason why pus is not formed in all such cases, is the absence of the efficient cause of a suppuration, that is the defect of a due oscillation of the vessels. (*See the second corollary*). It will, no doubt, be said, that it is rather a defect of the fermentation necessary for the formation of pus. But if it should be said, that the particular fermentation, proper for exciting a suppuration, consists in the moisture, or humidity, discharged from the adjacent parts; I answer, that in all the cases mentioned, humidity is not wanting, no more than in the uterus. Heat also, another principle of putrefaction, is found in all these cases. If it should be said, that this fermentation is produced by the nervous fluid, dignified with the pom-

pous title of *animal spirits*, and on which all the actions of the human body are made to depend, in such a manner, that it is useless to examine the particular structure of every part, to study the different actions of the solids, or to distinguish the different natures, consistences, masses, courses, and celerities of the various fluids; and that we need be at no pains to instruct ourselves in the mechanism of the human body, provided we know that this imaginary being governs in the animal œconomy, and executes the office of the *Archæus* of *Vanhelmont*, which reduces medicine to such a state, that the ignorant may know it as well as the learned and judicious part of mankind: But we may safely deny, that the animal spirits, when once extravasated, have a power of inciting any particular intestine motion in the blood. In a word, extravasated blood is never converted into pus, since this only happens to live parts. (*See the second corollary*). If any person admits, that the animal spirits, by the pain, determined to flow more copiously into the suppurating part excite a suppuration, he and I are agreed, with respect to the seat of that suppuration; but it remains that we examine, whether this copious discharge of animal spirits happens in the ruptured,



ruptured, or in the sound vessels; the ruptured vessels then are half mortified, their nerves are cut, they are destitute of the elasticity peculiar to live parts, and are hardly sensible. On the contrary, the sound vessels have their nerves preserved entire, are extremely distended, beat strongly, are inflamed, and very susceptible of pain, in consequence of which the spirits will flow copiously into the latter, but in a very small quantity into the former. Now pus is not formed in sound vessels, but in such as are ruptured and capable of giving it vent. The animal spirits then, which flow copiously into a suppurating part, will, by their mixture, produce some remarkable alteration in the sound vessels, but none at all in the stagnant juices, included in such as are ruptured.

To what we have hitherto said against the doctrine of the chymists, who look upon the corruption and disengagement of the acid parts of the blood as the cause of suppuration, we may add, that there is really no acid in pus, since Dr. *Pitcairn* has, by various experiments, shewn, that purulent spits contain no acid, but a large quantity of salt, analogous to that of harts-horn, whereas the chymists cannot prove the presence of an acid salt, to which

they attribute the principal effects of pus. As for the proof drawn from the corrosive quality of pus, 'tis of no force, since laudable pus is possessed of no such quality. Besides, others have a good reason to admit an alkaline salt as the cause of this corrosive quality, as they have to establish a fixed acid salt, especially since chymistry furnishes us with caustics of both these kinds. Thus *Hippocrates* calls those purulent spits acrid, which the chymists call acid. I shall just mention the greenish colour of the pus, which some advance as a proof of its acidity, as if such a colour indicated, that there were vitriolic salts in the pus, since colours do by no means denote the specific nature of the principles of any mixture; and since the experiments made by *Dr. Pitcairn* sufficiently shew the weakness of those proofs which the chymists draw from signatures, and other similar things. Be this as it will, an examination of the nature of pus by chymical experiments, is of no use with respect to the application of medicines; for which reason I have only made it subservient to the confutation of *Dolæus*, and his abettors.

PROPOSITION VI.

*To explain what happens when a suppuration is begun, and how the re-union of the parts is made after they have suppurated.*

WHEN the pus begins to ooze from the lips of a *wound*, and the lacerated extremities of the vessels are in some measure open'd, then the fluids contained in such vessels do not find a great obstacle to insinuate themselves into their extremities; consequently, the sound vessels being diminished, begin to discharge the superfluous load of humours which oppressed them. For this reason, the pus distilling from the ruptured vessels, and the sound vessels beginning to yield a freer passage to the fluids they receive, the tumor, tension, heat, and pain of the wounded part, also begin to be lessened. In a word, the wounded part is relieved as soon as the lips of the *wound* appear moistened with pus, the fever also, if there is any, is abated, and an universal relief perceiv'd thro' the whole body.

BUT, since in proportion as the pus continues to flow, the passages become more and more open in the lips of the *wound*, it follows, that

that the circulation of the fluids, in the wounded part, will become daily more free; and a time will come, in which all the violent symptoms excited by the efforts of nature, to form pus, will be mitigated and disappear altogether, since the lips of the *wound* discharge the pus without any pain. 'Tis to be observed, that the discharge of the pus will last as long as the fluids find some difficulty to circulate in the lips of the ulcer; for the blood happening to stagnate ever so little in the origin of the ruptur'd vessels, both on account of the flaccidity of these vessels, which are almost mortified, and because of the resistance and viscosity of the pus, it will be exposed to the action of the efficient cause of the pus; that is, to the pulsations of the sound vessels, in which the circulation is not as yet entirely free, and, consequently, it will be changed into pus, which will daily acquire a greater fluidity, in proportion as the blood is less accumulated; and being, by this means, less thick, and less divested of its serum, it will furnish a liquor less thick than it formerly was. The ulcer will, in like manner, continue to yield pus, till the extremities of the ruptured vessels are mortified, and being separated from the live parts to which they adher'd,

hard, cease to contribute to the formation of a purulent liquor.

WHEN at the end of some days, or of a longer time, if it so happens, the passage of the liquors in the lips of the ulcer is sufficiently free, the blood and lymph then cease to enter into the ruptured vessels; because they meet no resistance to flow into the sound vessels, and because these on all sides compress such as are ruptured, which become more and more flaccid, and have their extremities converted into pus. The formation then, and discharge of pus, ceasing by little and little, a more fluid kind of serum will transpire thro' the lips of the ulcer, and the ruptured vessels will have their origins obliterated, and their extremities entirely separated from the live parts. This is the manner in which nature herself deterges *wounds*. By this means the lips of the *wound* consist of sound and entire vessels; by this means the free course of the fluids maintains life in these lips; and, in a word, these lips being freed from the mortified vessels and corrupted humours which injured them, nothing remains in order to perfect the cure, but to re-unite and consolidate the divided parts.

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NATURE, which has not failed to proceed to the suppuration by simple means, will not certainly leave her work imperfect. All the sound and live vessels, which compose the texture of the lips of the deterg'd ulcer, do not terminate in the surface of that ulcer; for in such a state they could neither return the fluids they have received, nor preserve life in the wounded part. But these vessels being arrived at the surface of the *wound*, are so incurvated as to form a continued syphon, which serves to convey the fluids back to the heart. But these curvatures of the vessels are not confined, as they were before the part had suffered a solution of continuity; for they are secured from all compression, and in some measure suspended. Besides, the suppuration having totally consumed the lacerated extremities of the vessels to which they adhered, these vessels are no longer laterally compressed, in consequence of which they will yield more easily than before to the impulse of the fluids conveyed into their cavities, and dilating and extending themselves by little and little, they will represent so many small protuberances full of blood, and of a redish colour; in a word, the flesh will granulate, and spring forth from every point in the surface.

surface of the ulcer. The fluids continuing to be propelled into these soft, easily extended, and uncompressed vessels, they will be daily lengthened more and more. Thus the efflorescence of fleshy granulations will be gradually augmented, these granulations will be inflated, and assume a larger bulk, and vegetating from every part of the lips of the ulcer, will at last meet and insinuate themselves, after the manner of *cotyledons*, into the cavities which present themselves. If two opposite protuberances should meet, that which makes the least resistance will be turn'd to a side, whilst the other will continue its road betwixt it and the adjacent granulations. Thus the lips of the ulcer will be re-united by the mutual reception of these eminences into proportionable cavities. The continual arrival of fluids will daily render this reciprocal union of the granulations of flesh more intimate. What contributes still farther to augment the strength of the cicatrix is, that the nutritive lymph adheres strongly, and copiously, to the sides of the distended neuro-lymphatic vessels, because the curvatures and compression of the vessels of the cicatrix, make a great resistance to it. The union of these granulations of flesh is so intimate, that, if we use force to separate them,

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they will be torn rather than quit their embraces; because their extremities, as being softest, are strongly foder'd to each other, and because their origins mutually compressing each other, these extremities have acquired too great a bulk to pass thro' the interstices which before gave them access. On this occasion, the work of nature resembles what cabinet-makers call the dove-tail. This then is the mechanism, by which a cicatrix is formed in soft parts, and a callus in fractured bones.

WE may therefore conclude, from what has been said, that the extremities of the ruptured vessels are not united afresh, so as to form continued ducts, as they did at first; for it is not possible to conceive, that vessels, especially of the same kind, should exactly meet each other, and be united in their original manner: Neither can the extremities of the ruptured and lacerated vessels be preserved sound and alive, during so long a time as is requisite for suppuration; but they become corrupted, and are separated from the live vessels, as we have before shewn, from what happens in the amputation of limbs. Besides, it has never been observed, neither is it possible to conceive, that what remains of  
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these ruptured vessels, can be lengthened by any kind of mechanism.

'Tis equally absurd to look upon a cicatrix, or callus, as an union of the divided parts, made by means of a coagulation of the extravasated nutritive juice; for those who are in the least acquainted with the animal œconomy know, that extravasated liquors are always unfriendly to the principle of life. Besides, 'tis certain, from anatomy, that a cicatrix, or callus, which are continuations of the parts, are really form'd by the elongation of the sound vessels of these parts; and it is impossible to conceive, that the nutritive lymph can form new vessels, which serve to lengthen such as are ruptured; for it is not reasonable for a physician to suppose *imaginary beings*, in order to explain what passes in the human body, especially when, in examining nature with attention, we discover realities which shew us the true mechanism she employs in many cases, in order to obtain her ends. As for the possibility of the elongation of the sound vessels in the human body, 'tis not to be doubted of, by the person who knows how much the membranes are susceptible of extension, and what a considerable thickness they are capable of assuming, how enormous the dilatations of

the vessels sometimes are, how considerably the viscera are inflated, and what extraordinary bulks they may acquire; how many observations of this nature are recorded by surgeons, and how common it is to meet with similar cases in practice.

THE vessels are not arrang'd in the same order, in a cicatrix, or callus, as they are in parts whose continuity has not been interrupted; and this difference is sufficiently observ'd in a part where there is a cicatrix; for it is not so smooth and equal as it was before it was wounded. This happens, because the vessels are not inosculated by anastomoses, as some imagine. In a cicatrix, or callus, all the vessels are folded back as it were on themselves, and none of them pass from one margin of the cicatrix, or callus, to the other, but are confusedly mixed and interwoven with each other; by which means they unite the lips of the *wound* just as a strong and close seam would do. Hence it is, that there is no passage of the liquors of one of the sides of the cicatrix into the other, but that they return into the same side whence they came. Hence it is, that the circulation of the fluids in the vessels of a cicatrix, which are  
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turn'd back on themselves, and mutually compress each other, is not so easy and free, as in parts which have never suffer'd a solution of continuity. Hence it also is, that persons now and then perceive pains in cicatrixes and calluses.

HAVING hitherto accurately and methodically examined, how the discharge of the pus is made, how it at last ceases to flow, how nature cleanses the ulcer, and afterwards produces the cicatrix, we now come to explain the manner, in which the whole body is affected, when the pus is once form'd.

IN copious suppurations then, especially those of the viscera, the body sometimes shivers and is cold, when the pus is ready to flow; for if at this time, we feel the patient's extremities, we perceive them cold; the pulse is also weak, small and depress'd; after which, it is rais'd at the end of a certain time, and becomes gradually fuller, stronger, and more frequent. The cheeks also, which were before pale, become red, and the whole body is seiz'd with a burning heat. All these symptoms are produc'd by the mixture of the pus, with the mass of blood; for we cannot, on these occasions, as in the case of the preceding proposition,

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sition, accuse the strong vibrations of the nerve in the suppurating part, since it frequently happens, that the patient has not the least symptom which indicates a begun suppuration; and since it is only by means of the patient's shiverings, that we discover a suppuration which is carried on in a latent manner. Thus physicians are enabled to prognosticate concealed suppurations in the lungs, the liver, and other viscera, when patients are seized with shiverings, which have no manifest cause. Besides, the shiverings which happen on these occasions, are not deceitful and only apparent, since the body is really cold, and the blood in a bad state and condition. That the pus is on these occasions mix'd with the mass of blood, is sufficiently certain, since pus is frequently filtrated through the secretory organs, at a great distance from the suppurating parts. The kidneys are the organs which most frequently afford a passage to this purulent matter by the urinary passages.

It sometimes happens, that when the pus begins to be formed, the pulsations of the sound vessels are not sufficient to express it from the extremities of such as are ruptur'd, either because the sound vessels are not strong  
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enough, or because the pus is too thick and viscid, or because the quantity of it is too great, or because the extremities of the ruptur'd vessels are not sufficiently open'd, but terminate in a part which is either entirely shut up, or not sufficiently dilated. 'Tis sufficiently obvious, that in all these cases, the part cannot easily discharge the pus form'd in it, either because it is acted upon with too little force, or because it too strongly resists its own expulsion, or, lastly, because it does not find a free vent.

HENCE it is, that in copious suppurations, the pus, by its bulk, oppressing the ruptur'd vessels, cannot easily yield to the pulsation of the sound vessels, which make an effort to force it through the extremities of such as are lacerated, in consequence of which, being press'd on all sides, it will flow, as through so many channels, into the collateral vessels which are sound, and by this means corrupt all the humours.

ALMOST the same thing happens in the conceal'd suppurations of the viscera; for as these organs are generally compos'd of very delicate and open vessels, and not furnished with strong fibres, so they want force to ex-

pel the pus. Besides, if the pus is too viscid, as it is in the suppurations of the tubercles of the lungs; or if it does not find a free issue, which often happens in the viscera, when suppurating, when for instance the abscess has no aperture on the external surface of the part, or when the aperture of the ulcer is too narrow; in all these cases, in which the surgeon's hand cannot have access to the affected organ, the substance of the part cannot be freed from the pus, in proportion as it is formed. Hence the continual pressure which acts upon it, will make some portion of it pass into the collateral veins, by which the mass of blood, and all the humours, will be infected.

BUT as the circumstances we have mentioned, happen more frequently in the viscera, than in other suppurating parts, and as all of them frequently concur and meet in the former, hence it is, that we more frequently observe this mixture of pus with the blood in suppurations of the viscera, than in those of other parts. Besides, the viscera, both on account of the large vessels distributed through them, and their proximity to the heart, must of course communicate the bad qualities of the pus to the blood, much more easily than any other parts of the body.

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THE flakes of pus being thus mixed in a great number, with the blood, without changing their form, are thick, viscid, and difficultly divided. So that by inspissating the mucilaginous and globular parts of the blood, they will retard their motion here and there, and render it unequal; in consequence of which, the intestine motion of the blood will be diminish'd, the pulse will become weak and small, the body will grow cold, and the strength be exhausted. But the blood which has been thus speedily and unequally inspissated, passes with difficulty through the capillary vessels: hence arise the languid and unequal vibrations of the nervous filaments; hence also arise the shiverings, and the tremblings of the muscular and membranous fibres. On the other hand, the blood which finds a difficulty to pass into the capillary vessels, is forc'd to return into the large vessels, for which reason many of the secretions cease almost entirely; thus the saliva is glutinous and discharg'd in a small quantity, by which means the mouth is render'd dry. The same also happens to the other secretions.

BUT as the resistance which the blood finds to make its way through the capillary vessels,

is augmented for some time, and as by this means a great quantity of blood is gradually accumulated in the large blood-vessels, these will, at last, be preter-naturally distended, and their vibrations, as well as the contractions of the heart, becoming more frequent, the fever will begin to appear. But these pulsations not only continuing, but also augmenting, the molecules of the blood, however large, will be strongly agitated, and the fever, when excited, will continue to be considerably violent, till the molecules of the blood are broken, and attenuated, to such a degree, that it can freely pass thro' the capillary vessels, and that the redundant fluids being eliminated thro' the secretory vessels, which before refused them access, but are now free and open, and especially thro' the secretory organ of the skin, by way of sweat, the resistance the heart and large blood-vessels meet with, and the distension they suffered, may be totally removed.

BUT at the time the pus is mixing with the blood, and produces a fever in it, it sometimes happens, that the violent pulsations of the vessels, and the great quantity of pus, break the obstacle found in the lips of the ulcer, whose surface is, in this case, covered with the pus, which,

which, for that reason, no longer corrupts the mass of blood, by mixing with it.

IF, however, on account of some of the inconveniencies we have enumerated, the pus should not be discharged from the surface of the ulcer, in proportion as it is form'd, a small portion of it will be still conveyed into the collateral vessels, and thus the blood being constantly infected by it, the fever would be of the continual kind, with frequent augmentations, and accompanied with shiverings every time the collection of pus in the blood-vessels is augmented. But if this mixture of the pus with the blood should continue for a long time, and consequently protract the fever, the disorder would, in this case, lose the character of a slow fever; for so violent an intestine motion, continued for so long a time, would, at last, dissolve the mass of blood, and destroy its mucilaginous or balsamic part so necessary to life, in consequence of which, this blood would be no longer proper to resist the pulsations of the arteries, and furnish the neuro-lymphatic vessels with that mild and sweet kind of dew, which ought to be the matter of nutrition. The liquors separated in the different secretory vessels from a blood thus impoverished, would serve  
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but very imperfectly for the exercise of the functions ; hence arise a languor and listlessness in the vessels and fibres ; hence also arise bad digestions, daily loss of strength, and an universal dryness, and consumption of the whole body.

AFTER the flakes of pus, which were too large to pass thro' the capillary vessels, have circulated some time in the vessels with the blood, the febrile motion at last breaks and attenuates them, as we have already observed ; and when they are once divided, they are eliminated thro' the various emunctories, but especially under the form of foetid sweats, carried thro' the pores of the skin, with the lixivial serum of the blood. But if it happens, during the time of their mixture with the blood, and when they swim in its serum, being but little divided, that they should be presented to sufficiently open secretory vessels, they will not fail to insinuate themselves into them ; and as the motion and velocity of the fluids are much more slow in the secretory than in the blood-vessels, hence it follows, that the flakes of pus will not preserve the intestine motion, which kept them separated from each other in the blood-vessels. Many of them will be united together, and  
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form larger flakes, which, however, will be conveyed farther, because the secretory vessels by uniting with each other become larger and larger ; for which reason the trunks of the secretory ducts will contain, as it were, drops of pus perfectly formed.

As the secretory ducts of the kidneys are naturally very open, and easily admit a large quantity of the lixivial serum of the blood, if these ducts should in some patients happen to be more open than usual, and if the flakes of pus swim freely in the serum of the blood, without any union with the mucilaginous parts of that fluid, it is evident, that these flakes will easily pass thro' the secretory ducts of the kidneys, and re-unite into many sensible drops, by the mechanism we have now explained. The urine will partly drop from the protuberances which form the kidneys, but these protuberances will, at the same time, also discharge drops of pus, which will re-unite, and become larger by their continuance in the pelvis and bladder. Thus, 'tis not surprising, that some patients should discharge pus with their urine, tho' the seat of the suppuration is not always in the kidneys. This is also frequently observ'd in those who have pus discharged

charged into the cavity of the thorax, as also in phthifical patients, when their disorder is in its last stage; since, in such patients, the mucilaginous parts of the blood being destroyed, the pus is no more confined and sheathed up by it, but floats freely in the serum.

THE secretory ducts of the intestines are also very large, numerous, short, and but little incurvated, or winding, so that patients who have these ducts greatly dilated, especially by a diarrhæa, will be afflicted with a purulent flux. This, and even sometimes a discharge of purulent urine, is observed in desperate phthifical disorders.

'Tis also certain, that the biliary ducts of the liver are very large, especially if we consider, that the matter of the secretion made in this organ, is furnished by the venous blood, and that consequently the molecules of it are so gross that they can only pass thro' considerably large orifices. For this reason the flakes of the pus will, in some patients, take the same road with the bile. But as the biliary pores make a very extensive passage in the substance of the liver, and as the bile which passes thro' them, is an humour naturally pretty thick, many of the particles of the pus will there unite themselves.

selves, and before they pass into the larger trunks, acquire so considerable a bulk, that not being able to go farther, they will soon obstruct the ramifications of the biliary duct. By this means the adjacent blood-vessels will be compressed by them, and becoming inflated, a rupture of them will ensue, in consequence of which a suppuration will be formed in the substance of the liver. This is the cause of abscesses of the liver, which are form'd, insensibly and unexpectedly, in persons who have any part of their body suppurating, as is sufficiently obvious from observation and experience.

It has been observed by some of the most skilful and judicious physicians, that abscesses of the liver, principally happen in suppurations of the internal parts of the head, which can only be attributed to the particular quality of the pus formed in the head; since, we have not as yet, by anatomical disquisitions, found any communication between the brain and liver, sufficient to account for this phenomenon. I am therefore of opinion, that the pus of the head, as being composed of thin, disengaged, and highly active fluids, is an extremely fine mucilages, whose flakes insinuate themselves  
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## 206 *An ESSAY on the Suppuration*

into the biliary pores, in such a manner, however, that many of them there unite for the reasons already specified, which sometimes gives occasion to the suppurations formed in the liver. 'Tis also to be observed, that cases of this kind are frequent, and constantly happen in the circumstances before mentioned.

'Tis not only when the blood receives the continual mixture of the pus, that a slow fever seizes the patient, since the body is also too much dried and exhausted, when an ulcer suppurates too copiously or too long; for by these means it happens, that the blood is deprived of a large quantity of its mucilaginous part, which drops continually from the small ruptured vessels of the ulcer, especially from the neuro-lymphatics, and which generally forms the matter of the pus.

HENCE the blood being once deprived of this mucilage, its most moveable parts have no longer any thing to retain and check them, so that the pulsation of the vessels communicates too great a motion to them. The fibres of the vessels being no longer softened, and kept pliable, by this mucilage, become dry and rigid; hence arise the brisk and frequent pulsations,

tions, the increas'd loss of the mucilaginous part of the blood, and the consumption of the whole body. Thus, ulcers which are very large, or suppurate too copiously, or long, bring on an incurable atrophy.

It now remains, that we enquire what are the different modifications, which suppurating parts receive, as to their external form.

### I.

WHEN the surface of a suppurating part is not covered, but the pus discharged finds a free vent, we call this an ulcer.

### II.

WHEN the internal, and most latent substance of a part, has suffered a solution of continuity, and is lacerated and suppurated; the interval between the divided parts becoming full of pus, discharg'd from the extremities of the ruptured vessels, there is formed a collection of pus pent up, and confined on all sides, and this is what we call an abscess.

IF the substance of any part is but thin, and the abscess not large, it generally produces an eminence in this thin part, because the spher-

rical bulk of the discharged pus being pressed upon by all the contiguous parts, which are tense, and endeavour to contract themselves, it is forced into the part whose texture is most lax, and consequently makes the least resistance, so that the softness, and fluctuation, are principally perceived in that part.

### III.

BUT when a suppurating part has a small aperture, thro' which the pus passes with difficulty, the soft adjacent parts, which it separates by its presence, making an effort to contract themselves, express it from all parts. But as it cannot be easily expressed thro' the aperture of the affected part, either because it is too high, or too narrow; it follows, that the effort of the power which produces this expression will extend itself to all the adjacent parts. Thus these parts will be gradually separated, and their division augmented, by which means the pus will insinuate itself into the interstices left between them. Now when the pus is dispersed thro' considerably extensive interstices, as into so many nitches, these cavities are called sinuses.

THE acrimony of the pus, when it happens to be possessed of such a quality, also assists the formation of these sinuses; for it destroys and corrodes the minute parts, which united the fibres with each other, and the pus gradually insinuates itself into these small divisions which have no vent.

*F I N I S.*



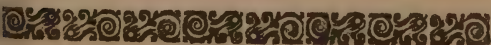
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THE SECOND  
DISSERTATION,  
OR, A  
CONTINUATION  
OF THE  
ESSAY  
ON  
SUPPURATION.

In which

The principal Phenomena happening in  
the soft Parts, are examined and in-  
vestigated.



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THE SECOND

DISSERTATION,

OR, A

CONTINUATION *of the* ESSAY *on*  
SUPPURATION.

AS a suppuration, when laudable, is the effort of nature to relieve herself, an effort carefully to cleanse the ruptured vessels from the fluids remaining in their cavities, and which are no longer subject to the laws of the circulation; an effort to procure a free passage to the rest of the fluids in the sound vessels, and consequently to remove the obstruction formed in the part which had suffered a solution of continuity, and afterwards to procure an elongation of some vessels, and thus make them appear under the form of fleshy granulations; and, lastly, to intermix, and unite them in the manner which  
joyners

joyners call the dove-tail ; so 'tis also sometimes observ'd, that nature either wants strength to execute her ends, or varies in her measures, or swerves from the true method she ought to take, or takes an absolutely contrary one, so that she is sometimes unsteady, or succumbs, or becomes languid, or presents different phenomena, or labours to her own disadvantage. Hence it is, that suppurations do not often succeed, as we could wish, but require great skill both in the physician and surgeon to treat them as they ought.

FOR this reason I shall, in the present dissertation, treat of the varieties with which suppurations present us, in the different manners in which they terminate, and of the symptoms which accompany them ; for having carefully observed the measures of nature, in the work of suppuration, and consequently having reason for our guide, and being able to judge with certainty, of the state of suppurating parts, it will be no difficult method of employing proper methods of relief, when nature is once overpower'd, languid, or deviating from the true way.

## PROPOSITION I.

*To examine why, when in a soft part, blood-vessels, and others interwoven with them, are ruptured, there is sometimes no suppuration at all, or, at least, a very small one brought on with difficulty; and why it sometimes ceases after it is begun; or only proceeds slowly.*

VARIOUS causes may render nature incapable of exciting a suppuration, or make it languid when it is begun, and often stop it entirely; for which reason we shall examine the most considerable and important of these causes.

### 1.

If a suppuration happens, it must necessarily follow, that the vessels of the part, which has suffered a solution of continuity, will be filled with a far greater quantity of fluids than usually; and, that the sound vessels will be distended, and beat much more strongly. *This is what nature herself demonstrates, since she never excite<sup>t</sup>s a suppuration without a previous inflammation.* For this reason, if the vessels are not sufficiently inflated, and if the humours flow freely, and

and with ease, the efficient cause of a suppuration, which is the reiterated pulsation of the sound vessels, will either not act at all, or, at least, but weakly. On the other hand, the matter of suppuration will either not be formed at all, or generated in a very inconsiderable quantity in the ruptured vessels ; in which case, there will be either no suppuration at all, or a very small one. For this reason *ecchymoses, exanthematous eruptions, lashes of whips or rods*, and the *spots* which appear on different parts of the body, in malignant fevers, do not generally suppurate. For this reason also, cut parts suppurate little or none at all, when they have discharged a sufficient quantity of blood. For this reason, we also sensibly hinder the suppuration of *wounds*, when, by the application of resolvent medicines to their lips, and the parts adjacent, we force the blood to flow with too much facility, thro' the minute vessels.

## II.

IN order to carry on the work of suppuration, as it ought, 'tis necessary, that the vital motion of the vessels should be considerably augmented, and render'd stronger. This is sufficiently evinc'd by the inflammation which not  
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only precedes all suppurations, but also, in some measure, continually accompanies them. But as the blood-vessels beat more strongly than the others, and are also filled with a more active, and copious fluid, which generally constitutes the true pus, it is consequently evident, that the parts in whose composition there are few blood-vessels, will suppurate more slowly than the others. Hence it is, that ligaments, tendons, pinguious membranes, and such as are extremely fine and tense, as the *periosteum*, and *perichondrium*, the proper membrane of the muscles, and all other similar parts, are not so easily brought to a suppuration as the muscular parts. The same holds true with respect to glandular bodies, which receive but little blood, and are copiously moistened with a lymphatic humour, such are the lymphatic glands, as the *salival glands*, the *pancreas*, and other similar parts.

### III.

IF a large number of vessels are cut, ruptured, bruised, or lacerated, the small number of such as are entire will not be sufficient to maintain the vital motion in the part, without which, however, a suppuration is not to be

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expected;

expected; for, in this case, the sound vessels are too much dispersed thro' the extent of the part, to be able, by their pulsations, to resist so considerable a bulk of ruptured vessels which are inactive, and full of stagnant humours; so that the sound vessels will rather be oppressed themselves, than excite the smallest motion in the part. For this reason, a suppuration will not happen at all, or, at least, very imperfectly; since, in such cases, a mortification most generally seizes the part. For this reason also, parts violently contus'd, or bruised, and wounds, made by fire-arms, suppurate with difficulty, and are subject to a gangrene. 'Tis for the same reason, that parts corroded by caustics, shrivelled up by the frost, or burned by the fire, do not suppurate; for the action either of corrosives, fire, or intense cold, reduces the parts to a kind of collection of ruptured and lacerated vessels, confusedly mixed with the extravasated humours. This inactive, and totally mortified mass, which adheres to the live parts, is afterwards dried, and forms a crust which we *eschar*. But as below this eschar, there are both lacerated and sound vessels, in consequence of which, the subjacent part is still alive, so  
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in such cases, 'tis generally this part that suppurates.

#### IV.

GRANTING that there is not a great number of vessels ruptured in a wounded part, as we suppose in the following cases, yet if the sound vessels are preternaturally distended by fluids, either too copious, or too much rarified, obstructions will necessarily be formed in them; for their coats being thus dilated, cannot restore themselves to their natural state, in consequence of which, their alternate motions will cease, the course of the liquors will be intercepted, and at last these vessels will break entirely, all of a sudden, and this rupture will be accompanied with a sense of burning. The action of the vital principle will, by this means, be suffocated; in consequence of which, there will be no suppuration, but a mortification will rather happen in the part. Thus, when wounds are violently inflamed, and the parts as it were burning, as in painful *erysipelas*, certain *carbuncles*, and all cases in which the patient perceives a lively sense of burning, which is a sign that the ultimate texture of the part suffers dilaceration, we ought not to ex-



pect a suppuration, but rather to dread a gangrene; for which reason too, acrid topics, as *vesicatories, acrid spirituous remedies*, and other things of a like nature, frequently, by preternaturally inflaming the parts which ought to suppurate, or the lips of a *wound*, either hinder a suppuration, or stop it when it is begun, and by this means lay a foundation for a subsequent mortification.

## V.

WHEN the vessels are too empty, they hardly beat, remain inactive, and only furnish the ruptured vessels with a very small quantity of liquors; in consequence of which, the efficient cause of a suppuration is too weak, and what ought to be the matter of the pus, formed in too small a quantity. Thus when the vessels are rendered empty, after a copious hemorrhage, the *wound* either does not suppurate at all, or, at least, the suppuration is slowly made. Thus, also, when wounded patients have their strength exhausted, they frequently fall into a *deliquium*. In a word, when the heart forces the blood but weakly into the wounded part, little or no suppuration happens, or it is stopt when begun, and the ulcer becoming

coming dry, the part assumes a pale or livid colour, and is sometimes seized with a gangrene. This is often observed in malignant and contagious diseases, especially those of the pestilential kind, in which 'tis frequently impossible to bring the *parotids*, *carbuncles*, *buboes*, and *pustules*, to a laudable suppuration, whilst these tumors degenerate into a *gangrene* and *sphacelus*, in spite of all the measures taken to prevent such a misfortune.

## VI.

WHEN the obstructed vessels are flaccid, paralytic, or too much relaxed, their oscillations easily cease ; for, in such cases, they have not sufficient force to propel their contained fluids farther, however small the redundant quantity they have received, should happen to be. In this case then, the vital principle becomes languid in the wounded part, whence a mortification, or an imperfect suppuration, ensue. This sometimes happens in persons of delicate constitutions, and very frequently in patients of *dropfical*, *scorbutic*, and *cachectic* habits of body. Hence it is, that incisions, and especially contusions, in œdematous parts, are to be dreaded, on account of the gangrene to be

suspected, or, at least, because of the difficulty cured ulcer, which generally supervenes, as is observed by *Hippocrates* in aphorism 8, sect. 6. on account of the impossibility of cleansing and detarging it. Hence it also is, that paralytic parts suppurate slowly, and with difficulty; and that when parts of this kind are wounded, and especially contused, we have great reason to dread a gangrene.

## VII.

If the sound vessels are very much dried, they will be too rigid to yield to the efforts of the fluids conveyed into their cavities; for which reason they will hardly beat, and will not be capable, by their oscillations, to compress, attenuate, divide, and change into pus, the liquors which are become stagnant in the ruptured vessels. By this means, suppuration will be either totally hinder'd, or only imperfectly carried on. Hence it is, that parts accustomed to continual labour, suppurate with difficulty. Hence it also is, that suppuration never happens in the manner it ought, in old persons. The too frequent use of hot topics, also frequently hinders, or retards the formation of pus. Besides, in parts thus dried and in-

durated,

durated, the fluids are so deprived of their serum and mucilage, that there is not a sufficient quantity of the matter necessary to procure the due fluidity of the pus.

### VIII.

WHEN the vessels of a wounded part are, by their natural elasticity, rendered too tense, the fluids they receive can hardly distend them; their pulsations do, indeed, by this means, become quick and frequent, but not large and strong. Hence the matter contained in these vessels is weakly compressed and agitated. Besides, the cavities of the vessels being lessened, by the spasmodic contraction of their coats, only a small quantity of fluids passes through them; in consequence of which, the ruptured vessels will receive too little of the fluids, which ought to furnish the matter of the pus. Hence when the vessels of a wounded part are in this state, the suppuration must of course be small, and performed with great difficulty. For this reason, *wounds* accompanied with intense pains, or spasms, in the intimate texture of the part, suppurate but little, and very often have their lips dry and parched. This happens frequently to *wounds* of such parts as are extremely ner-

vous, and possessed of an exquisite sensation, as well as after a too long continued application of acrid and caustic medicines to the wounded part. The same happens when the mass of blood is too acrid, and divested of its serous and viscid parts, or when it is not in a condition to furnish the mucilaginous liquor necessary for the formation of pus. 'Tis also for this reason, that *wounds* accompanied with a superficial erysipelas, which transpires highly acrid particles, can hardly be brought to a suppuration, but continue obstinately dry; and when the tension and spasms of the vessels are still more augmented, these are broken and dilacerated, so that a gangrene ensues, as is observable in those carbuncles which are accompanied with a burning erysipelas.

#### IX.

EVERY thing which occasions too strong a compression on the vessels of a part, which has suffered a solution of continuity, hinders the free return of the blood to the heart; in consequence of which, these vessels will be greatly obstructed; or, if their compression is still farther augmented, they will not receive a sufficient quantity of fluids, and the small quantity conveyed

conveyed into them will only circulate slowly. Thus, in both these cases, the pulsation of the vessels will be languid, which will either totally hinder the suppuration, retard it in its progress, or even induce a mortification. In the former case, the sign of this mortification is the *burning heat* of the part; and in the latter, the excessive, and intense *coldness* of the part. (*See the articles four and five*). These inconveniencies, also, generally happen when fractured, or luxated bones, rack and strain the wounded part, when the bandages, compresses, splints, and the rest of the dressing are too tight, and still oftner, when, according to the custom of some surgeons, the cavities, and sinuses of suppurating parts are filled with tents, or lint, forcibly introduced in order to dilate them.

## X.

IF the fluids are inspissated, and inactive in the part affected, the vital action of the vessels will either become languid, or totally cease, and the matter, which ought to be converted into pus, in the ruptured vessels, becoming very thick, will make too great a resistance to the pulsations of the sound vessels, and render them



them useless, so that an imperfect suppuration will ensue. Hence it is, that the *cold air* is so prejudicial to suppurating parts, and that *repellents*, unseasonably applied, stop a suppuration. 'Tis also thus, that certain *poisons* thrown into *wounds*, either prevent a suppuration, or stop it when begun. Hence, if the causes we have mentioned, or others of a similar nature act too strongly, they sometimes produce a *gangrene*, and sometimes a *scirrhus*; a *gangrene*, when they totally stop the course of the humours; and a *scirrhus*, when they only act successively, and when, during their action, the greatest part of the humours is conveyed into other parts.

#### OF THE EFFECTS OF THE SUPPURATION. **XI.**

IF the blood conveyed to the affected part, is deprived of its serum, and mucilage, commonly called its *balsam*, it will hardly furnish the ruptured vessels with any matter proper to be converted into pus, or, if it does, the supply will be very slow, on account of its too thick consistence. Or, if the blood, without entirely losing the serum which kept it in a state of fluidity, should yet want its soft, and lubricating mucilage, or, if it should be im-

pregnated



impregnated with a large quantity of hard, thick, and acrid particles, which are free and disengaged, then the fibres of the vessels being no longer lubricated, and rendered pliable by this mucilage, will necessarily become tense and rigid, and will even, sometimes, by the action of the acrid particles, contained in the humours, be irritated so as to enter into spasmodic contractions, and this will be same case with that in *articles* seven and eight. Hence the suppuration will be slow, and small, in all the states of the blood we have mentioned. For this reason, when persons who have used large quantities of hot and aromatic substances, happen to be wounded, their *wounds* suppurate little and slowly. For the same reason it also happens, that the *wounds* of hectic persons are dry, or but little moistened.

## XII.

IF the blood is deprived of these spirituous parts, and of that mucilage which ought to be equally distributed thro' all its mass, in however good a state its other principles are, yet the texture of the solid parts will have no spring and elasticity; in consequence of which, the blood will not be uniformly distributed into  
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the vessels, but become viscid, and its component parts will not be exactly mixed with each other, so that in one part they will be thick, viscid, tenacious, and difficultly divided; in another, there will be only an highly thin serum, separated from the rest, and elsewhere, the lixivial parts of the blood, and such as are impregnated with salts, will be hard, and too bulky; and the parts of both these kinds will be no longer obtunded and sheathed up, by a mild and balsamic mucilage. In a word, the union of the component parts of the blood, so necessary to render it capable of preserving life, will be almost entirely destroyed, and all the humours disposed to enter into putrefaction. In such cases, we may expect to see a languid suppuration, and have even reason to dread a mortification of the parts. This is observable in practice, when after malignant or putrid fevers of long duration, or, which have returned frequently, and have had but an imperfect crisis, the blood is become entirely vapid, especially when this happens in consequence of too violent *purgatives*, or *emetics*, frequently repeated in such fevers, either thro' ignorance, or thro' a fatal necessity, in order to prevent the terrible consequences of these diseases.

Hence,

Hence, diseases of this kind terminate thus, principally in old persons, because their blood is already impoverished. In old persons, and those who have for a long time committed egregious errors, with respect to the non-naturals, tho' perhaps they have not for that reason been afflicted with diseases, the blood is sometimes so corrupted, that if any of the parts of their bodies are but in the least wounded, or compressed, they either suppurate slowly, or are soon seized with a mortification. Sometimes also, a gangrene happens of itself, in patients of this kind, without being produced by any external cause.

## C O R O L L A R I E S.

### I.

IN such parts as have suffered a solution of continuity, a suppuration will either never happen, or else it will be very languid, unless the passage of the liquors thro' the minute, and capillary vessels of that part becomes difficult, and these vessels are in some measure obstructed.

## II.

**BUT** it is not sufficient that the blood-vessels, and those interwoven with them, be obstructed; since, in order to a laudable suppuration, 'tis also necessary, that the oscillations of the sound vessels should be strong enough to surmount the resistance made by such as are ruptured and obstructed, by stagnant and inactive fluids; for when the resistance of the ruptured and obstructed vessels is stronger, than the pulsations of such as are sound, the suppuration will be languid; or, if this resistance is still farther augmented, the part will be seized with a mortification. Mortification, in divided parts, may be looked upon as a suffocated and suppressed suppuration; and as suppuration is a certain sign, that life subsists in the parts, so when it cannot be carried on, 'tis a sign that the part is mortified.

## III.

**HENCE**, in the case specified in the first proposition, all the obstacles, and hindrances of a suppuration, may be reduced either to the too great resistance of the matter, which ought to be changed into pus in the ruptured vessels; or,

to the weakness and insufficiency of the pulsations of the sound vessels, so that the remote causes which either hinder a suppuration, or render it languid, or stop it when begun, only act by producing one or other of these inconveniencies.

#### IV.

ANOTHER obstacle to suppuration, is the slowness with which the humours are conveyed both into the sound and ruptured vessels, and the small quantity of the fluids which ought to be changed into pus.

#### V.

As the divided parts are full of fluids, which they ought to discharge by suppuration, before they are in a condition to consolidate, and as in consequence of this, the suppuration, is an effort of nature to free the affected part from every thing that may be injurious to it, in all the cases of suppuration we have hitherto enumerated, it follows, that the re-union of the divided parts will be made slowly, and even a cicatrix not formed at all, so long as the suppuration is languid, or not carried on at all. Thus, so long as the efficient cause of a suppuration does

not act in the lips of a wound, which are hard, dry, and disposed to a gangrene, the parts appear always open, lacerated, and disfigur'd, by lips that are either callous, parched, soft, and as it were putrified, or covered with a crust.

## PROPOSITION II.

*To explain why the suppuration of the soft parts varies so often, and considerably, in its beginning and progress.*

THO' in all suppurations we constantly observe certain essential phænomena, namely, in the beginning, a tumor not before observed in the substance of the part about to suppurate, and which is accompanied with heat, redness, and pain ; and afterwards a discharge of purulent liquor, which is at last succeeded by a production of new flesh ; yet, in the practice of surgery it is so common to observe so vast a variety of symptoms which precede, and accompany the formation of pus, and the generation of flesh, which, in some cases, is not formed at all, that it must certainly be of the greatest use to enquire what are the causes of these variations, and *anomalous appearances*,  
that

that we may for the future be able to establish more certain prognostic signs of *wounds*, ulcers, and tumors, and take the most safe and efficacious measures, with respect to suppurating parts.

WE do not, however, undertake the enumeration of all the varieties, and anomalous appearances, which present themselves in practice; since we only intend to examine the most considerable of these differences, and those to which all the others may be properly and naturally reduced. The principal causes then, producing the several variations in suppuration, both in its beginning and progress, are the natural constitution of every particular part, the preternatural qualities of the mass of blood, the alteration of the solids and fluids of the suppurating part, the manner in which the parts are divided, and the method of dressing the suppurating parts.

WE have already examined, why the suppuration is sometimes made with difficulty, or not at all, and even why, when the pus has begun to flow, it either stops suddenly, or is only slowly discharged. As we have shewn that these symptoms proceeded from the weakness, or oppression of nature, so we shall at present



present examine and investigate the deviations of nature from her usual course, after having observed, that she varies her work according to the different constitution peculiar to the suppurating parts ; for in however laudable a state the parts of the human body are, yet they do not all suppurate in the same manner, neither has the pus they furnish precisely the same qualities. Besides, as these parts differ, not only with respect to the vessels which compose them, but also with respect to the liquors distributed thro' them, so 'tis absolutely necessary, that they should present us with differences in the suppurations, which happen to them.

## I.

HENCE the fleshy parts, as the muscles, the skin, and others of a similar nature, being tender, delicate, and moistened with a large quantity of blood, and lymph, easily discharge a mucilaginous and moderately thick liquor, which is soft to the touch, without being subjected to any violent symptoms during their inflammation, whilst, on the other hand, the extremities of the ruptured vessels are speedily reduced.

reduced to a soft and whitish mass. Thus when parts of this kind are divided and obstructed, they soon, and easily come to a supuration; and the pus they furnish is in a due quantity, moderately thick, whitish, sufficiently fluid, without any smell, and possessed of all the qualities of a laudable pus; and if, on this occasion, nothing opposes the efflorescence of flesh, laudable and well-condition'd granulations begin to vegetate, as soon as the part is well deterged, and as perfect a cicatrix as could be wished for is formed.

## II.

BUT this does not hold with respect to tendinous parts, which being naturally very tense, and composed of a large quantity of nervous fibres, become very painful in the time of supuration, which produces *watchings*, a violent *fever*, with all its consequences, *spasms* of different parts, preternatural *tensions* of the nervous fibres, a *stagnation* of an hot inflammatory blood in the extremities of the capillary vessels, and, consequently, violent and extensive inflammations in all the adjacent parts, which frequently terminate in a gangrene, when the distension of the vessels is excessive. (See article

IV. *proposition* I.) Thus as the vessels, which enter the composition of tendons, are naturally very tense, and become more so, by the violence of the pain, and as these vessels adhere very closely to each other, and are only moistened with a little blood, which, however, is the principal matter of true pus, tendinous parts must of course suppurate with great difficulty. (*See articles II. and VIII. of the first proposition*). And the pus discharged from them will neither be so thick, nor so white, and well concocted as that formed in the muscular parts; on the contrary, it will be thin, tho' viscid and tenacious, as being produced by the lymphatic juice, the liquor with which the tendons is principally moistened.

THE tendons are not only subject to troublesome suppurations, but also the cleansing and deterging *wounds* made in them, is a long and tedious work; because having few blood-vessels, and receiving only lymph, which circulates very slowly, they have not force enough to expel the pus. (*See article II. of the first proposition*). Besides, many of the elementary fibres of the surface of a tendon, extremely distended and lacerated with pains, becoming dry in the time of deterging, when all the symp-  
toms

toms of the suppuration are removed, must be insensibly detached from such as are found, by the reiterated pulsations of these last, and be thrust outwards in the form of small laminæ, (*which is called the exfoliation of the tendon, and requires a long time*) that the live subjacent substance of the tendon, may produce flesh of a particular nature, proper to form a cicatrix.

### III.

MEMBRANOUS parts, which are very tense, and furnished with a large quantity of nerves, such as the common and proper membranes of the muscles, and the periosteum, are afflicted with violent pains when they are ready to suppurate. Hence it is, that on such occasions we observe all the symptoms before mentioned. The acute pains, the violent and irregular distensions, the watchings, spasms, and inflammations, excited when a nerve is punctured, or lacerated, without being intirely cut, happen, because the nerves being composed of many bundles of fibres, united by other transverse membranous fibres, it is impossible, that some of these bundles should be cut, but they must, in receding from each other, by means of the transverse fibrills, irritate, distend, and rack

rack the sound bundles of nervous fibres. Hence ensue all those terrible symptoms, which affect the nervous system, and which are mitigated as soon as the wounded part is entirely cut, because then there no longer remain any nervous fibres to be distended and lacerated. The same also holds true with respect to the punctures of the tendons. From what has been said, 'tis sufficiently obvious, that suppurations of nervous parts are difficult, and troublesome. The pus formed in these sorts of parts, is in small quantity, sometimes fluid and whitish, and at other times brownish, reddish, and aqueous, resembling sanies; and, in a word, such as are suited to the nature of these parts, which are moistened with a small quantity of blood, which is very fluid, and easily discharged, tho', in recompence, they receive a very fine, and highly attenuated lymphatic juice. But when a suppuration is principally carried on in the trunks of the nerves, the pus discharged is viscid, and partakes more of the nature of the lymph, than of true pus, and this is called *ichor*. But as soon as the nervous parts have ceased to suppurate, they are for a long time after moistened by a very thin lymphatic juice, which softening the fleshy granulations, which vegetate,  
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and which are very delicate, and proportioned to the texture of the part which produces them, retard the consolidation of the divided parts.

#### IV.

THE same symptoms also precede the suppuration of ligamentary parts, and others, adjacent to the articulations; for parts of this kind are generally very sensible, and susceptible of acute pains. But as these parts receive but little blood, (*see article II. proposition I.*) they suppurate very slowly, and the pus they furnish is unequal, on account of the thick lymphatic juice which is mixed with it, and continually distills from the ligaments, the sheaths of the tendons, and the perichondrium, and this juice is called the *synovia*. The continual discharge of it from these parts, greatly injures their detersion, and renders the cure of such wounds difficult and tedious, for which reason, the formation of a cicatrix, in such cases, requires a long time.

#### V.

THE pinguious parts, as the epiploon, the membrane, between the skin and the fat, and which includes this last, and other similar parts, suppurate

suppurate slowly, and with difficulty, and the pus discharged from them is glutinous and viscid. These parts are also much subject to a gangrene, because they abound with soft, flaccid,, and vesicular vessels, filled with a thick pinguious liquor, which circulates slowly; and these vessels, by their bulk, oppress both the sound and the ruptured blood-vessels, a small number of which are only found in the adipose membranes; in consequence of which, a mortification happens, (*according to corollary II. of proposition I.*) since the vessels do not entertain the life of the part. For this reason, there is formed in such parts, a thick viscid pus, generally composed of a pinguious and unctuous matter. For all these reasons, gangrenes have their seats in the *membrana adiposa*. For the same reasons also, suppurations of the testicles are difficult and tedious; and these parts are often subject to a gangrene, especially when they have been bruised. The brain also, whose substance is very delicate and moistened, by the nervous fluid which circulates slowly, can hardly enter into suppuration, but is soon and easily corrupted. But when soft and delicate parts, such as those we have mentioned, have suppurated, and send forth new flesh, this flesh



is also soft, flaccid, and often vegetates too quickly, because the vessels which compose them, being naturally soft, and dilated, and weakened by what they have suffered in the suppuration, yield to the fluids conveyed into their cavities, and are preter-naturally distended. Hence proceeds soft, insensible, flaccid, and fungous flesh, entirely improper for the formation of a firm and solid cicatrix.

## VI.

As the lymphatic glands of the conglobate kind, are for the most part composed of lymphatic vessels, folded back upon themselves, and as few blood-vessels enter their texture, they suppurate slowly. (*See Article 2. Proposition 1.*) For this reason these glands are subject to be indurated, and become scirrhus, both on account of the inactivity of the vessels which compose them, and the great quantity of lymph which is conveyed to them, and is highly susceptible of concretion. Hence it happens, that the pus is discharged from them thick, and with difficulty; and that the suppuration is easily stopt, by a supervening induration of the lips of the ulcer. These parts being thus obstructed, the vessels

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can neither be lengthened, nor the flesh vegetate, but the part, after the suppuration, remains ulcerated, with hard and callous lips. But if the induration of the lips is excessive, the elongation of the vessels, and the vegetation of the flesh will be carried on slowly and with difficulty. In a word, glandular parts never fail to cicatrize slowly. If the obstruction is but inconsiderable, the vessels will be greatly inflated in the lips of the ulcer, on account of the difficulty the lymph conveyed to them finds to return; they will also be lengthened too much, and produce flesh which is prominent, unequal, and unfit for the formation of a cicatrix.

ALMOST the same things happen in the salival, and other glands of a similar nature, which abound with inactive, viscid, lymphatic juices, languidly propelled into their vessels.

THE same thing also happens to the *inguinal* glands when they suppurate, as also to the *axillary* glands, those of the mesentery, those of the lungs, , all the lymphatic glands, and others of a similar nature, as the *parotids*, and the *amygdalæ*.

WE now come to examine what varieties, the blood, which contains all the other humours,

mours, is capable of producing in the work of suppuration, whether in the manner of its beginning, or in its progress ; for as the blood is the principal matter which composes the pus, so it is the agent which determines the efficient cause of a suppuration ; for accordingly as by its peculiar quality it is differently disposed to flow into the vessels, these beat differently in the part which ought to suppurate, or which is actually suppurating. The blood also when converted into pus, retains different qualities, and such as are analogous to those it had when blood.

VII.

IN a laudable and well-conditioned blood, the red globules and mucilaginous fibres, are found in a proper quantity, swim in a gently glutinous serum, and adhere to each other in a due degree. Thus the fluid resulting from a similar mixture is thick, equal, and of a laudible quality. It neither distends the vessels too much, nor too little, nor resists the effort they make in order to make it circulate, but in so far as that is necessary, in order to maintain their oscillations. When a suppuration therefore happens, the sound vessels will  
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beat strongly, and the pus formed of the red globules in the ruptured vessels, being intimately mixed and incorporated with the mucilaginous and ferous fibres of the lymphatic juice, which serves them as a vehicle, will be copiously discharged, and form a thick, equal, pure and laudable pus, without any smell. The efficient cause of a suppuration continuing to act with vigour, will cleanse and deterge the divided part ; and the sound vessels both of the sanguiferous and neuro-lymphatick kind, will afterwards be lengthened, and vegetate equally, adhering closely to, and mutually sustaining each other ; by whose means strong and florid granulations of flesh will be produced, which being interwoven with each other, will form a good and laudable cicatrix.

## VIII.

WHEN the blood is dissolved, the red globules are found to consist of other smaller globules, and the mucilaginous fibres are divided into very minute flakes ; for which reason all these particles being too much disengaged from each other, and carried here and there by the serum, make their escape on all sides ; and not being sufficiently glutinous, but  
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on the contrary too much disposed to flow, they hardly make any resistance to the systaltic motion of the vessels. Thus the coats of the vessels being little distended by such a blood, contract themselves but little, in consequence of which, the oscillations of the vessels being small and languid, the efficient cause of a supuration will act but weakly: Besides, a blood of this kind is easily discharged thro' the apertures of the ruptured vessels, and does not continue long enough in their extremities to be inspissated, for want of a vital motion, and to be afterwards reduced into a laudable purulent matter by the pulsations of the sound vessels. It sometimes happens, that some red or yellow globules are easily discharged from the extremities of ruptured vessels on account of their smallness and disengagement from the other parts of the blood, and without being divided by the action of the vessels, mix themselves with the pus, to which they communicate their own colour. For this reason, when the state of the blood is such as we have described, the pus discharged from wounds, is not concocted, but very fluid, unequal, and often resembling sanies; and the  
flesh

which afterwards grows is tender, reddish, easily lacerated, and ready to discharge blood, composed principally of blood-vessels very easily distended, filled with a blood which is very fluid, and wants the support of the neuro-lymphatic vessels, because these want a lymph sufficiently thick to procure them a due degree of firmness. Hence arise the softness, and small solidity of cicatrixes formed in wounds of this kind.

#### IX.

A gross and viscid blood is composed of very large globules collected into masses of a considerable bulk. The fibrous parts of such a blood, are also gross, and too closely united, not only with each other, but also with the red globules; and all these parts embarrass the serum of the blood, and keep it pent up in their interstices, whereas they ought to swim freely in it. By this means a fluid is produced which forcibly distends the vessels, on account of the difficulty it finds to flow thro' them, and to be divided into small particles. Besides, a blood of this kind is with difficulty discharged from ruptur'd vessels, since it remains, and is considerably inspissated in them, but is

at last agitated by the strong and reiterated pulsations of the sound vessels. And after it is thus converted into a purulent, glutinous and thick, tho' well concocted liquor, it is expressed and thrown out by these pulsations. The cleansing and deterfion of the ulcer in such cases require, a long time, and the flesh afterwards vegetates slowly, but is firm, as being produced by sanguiferous and neuro-lymphatic vessels, which are strong, elastic, and full of a glutinous and viscid blood and lymph. By this means strong and hard cicatrixes are produced, tho' a little fungous in the beginning.

## X.

IN the blood of cachectic patients, the red part is very inconsiderable and contains here and there collections of globules united with each other; but in recompence the blood of such patients contains a large quantity of the fibrous part, which is thick, and of a small bulk, being as it were contracted into itself. These two kinds of parts swim in a large quantity of serum, in which they are as it were lost. The ease with which the serum of such a blood escapes, and the softness it  
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communicates to the fibres, render the oscillations of the vessels weak and languid. This effect is also in some measure promoted by the gross parts, which finding no vent in different parts, form obstructions in them. Besides, a blood of this kind becoming stagnant in the ruptur'd vessels, has not all its parts exactly mixed; for the serum is easily separated and discharged, whereas the thicker and more consistent parts being composed of a mixture of many globules, and a large quantity of flakes of the fibrous part, remain obstinately in these vessels, without being attenuated and expressed, except now and then by the languid pulsations. Hence the suppuration is languid. (*See Article 6. Proposition 1.*) And the pus form'd is not of an equal consistence, but partly serous and fluid, and partly thick and full of grumes. The ulcer is also deterged with difficulty, and the flesh which afterwards grows, is soft, flaccid, unequal, and pale, being produced by the elongation of small vessels, some of which are filled with a blood which is inactive, and of a faint colour, but abounds with serum, and is unequally impregnated with some gross particles, and a lymph of the same kind; some vessels are obstructed, whilst others are totally  
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pervious, and easily extended on account of their softness, which renders the formation of cicatrixes impossible, or produces such as are imperfect, without a support, or require a long time for their formation.

## XI.

IN the various species of cacochymies, the molecules formed by the assemblage of globules, are generally ill-conditioned, and swim here and there, some of them being large and some of them little, because they are not composed as they ought to be of a mild mucilage reduced to small globules, but of saline, hard, and gross particles. Besides, there swim among them fibrous parts, of an unequal bulk and different consistence, commonly impregnated with saline parts of different natures. All these parts have for their vehicle, a serum more or less saline, according to the different cases, being sometimes entirely fluid, and at others saline and viscid. Now in such constitutions of the blood, either its circular motion is retarded, and the oscillations of the vessels become languid ; or sometimes the motion of the blood thro' certain vessels becomes too rapid, at the same time that it passes with  
difficulty

difficulty thro' some capillary vessels ; namely, when there is a slight fever, and the small vessels are at the same time irritated and rendered tense. For all these reasons a suppuration is languid in cacochemical patients. (*See Article 11 and 12. Proposition 1. and 10. of the present Proposition.*) And the purulent liquor is ill prepared, and of an unequal consistence, or the pus discharged from the lips of the ulcer, has various bad qualities, such as its fetid smell, or the diversity of its colours, as yellow or green. The pus is also more or less acrid, differently irritates the lips of the ulcer, and sometimes corrodes or destroys them. Besides, purulent liquors of this kind are of an unequal consistence, so that in one part they appear under the form of a thick sanies, and in another, under that of an acrid fluid, which corrodes the substance of the part. The lips of the ulcer are hard, callous and unequal, when there are neuro-lymphatic vessels obstructed by gross molecules. The flesh is soft, fungous, and rises above the level of the part, when a too aqueous saline lymph has penetrated far into the neuro-lymphatic vessels. All these differences will make ulcers appear fetid, verminous, carcinomatous, malignant,

of a bad kind, fill'd rather with a virulent, than a purulent humour; and, in a word, highly unseemly. Such ulcers can hardly produce laudable flesh; for the deterfion ought to precede. This vegetation of flesh can only be made with difficulty, and sometimes not at all, as I shall shew, when treating of the suppuration of a cancer. But as we have already observ'd, the flesh generated, will be hard in one place, softer in another, mixed with sanies, unseemly, and incapable of cicatrization, at least, in such a solid manner, as that a future rupture is not to be dreaded.

## XII.

THE blood of scorbutic patients, is depriv'd, as well of its active parts, as of its mucilage, which being equally distributed through the whole of its mass, produced an uniform mixture and union of the other parts. The globules of such a blood, form close and compact masses, which swim in a serum, too much impregnated with salts, and the extremely gross fibrous parts of the blood. The vital motion of the sound vessels, in the wounded parts, is in such patients highly languid; because the mucilage of the blood, not being extended e-  
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very where, these vessels are not uniformly tense in all their length, but are rather obstructed by gross molecules, and relaxed by the serum separated from the other parts of the blood. A suppuration will not therefore be carried on as it ought in scorbutic patients, (*See Article 10. Proposition 1.*) and the ruptur'd vessels will discharge a pus, which is thick, unequal, briny and easily corrupted, by its continuance in the parts. But as at last, there is a rupture of some of the sound vessels obstructed with black and compact globules, and with highly saline fibrous particles, which circulate difficultly, there will be now and then spread on the surface of the ulcer, a sanies, which is black, saline, and resembling a lixivium, become fetid, by the corruption it has contracted. Hence it is, that the pus of scorbutic patients is unequal, like sanies, fetid and cadaverous. Besides, the blood-vessels which are in the lips of the ulcer, and which are full of a black blood, and the neuro-lymphatic vessels, which are full of a viscid and saline lymph, will produce a fungous flesh, which will be easily broken; for which reason, such ulcers will appear livid and putrid, and at last becoming

becoming reddish, they will assume a very disagreeable smell.

BUT if this fungous flesh should happen to break, other soft and fungous flesh will forthwith rise in its stead ; because the vessels of the lips of the wound are always obstructed with a large quantity of gross molecules, and softened by a saline serum, which renders them easily distended, inflated, and subject to a new rupture, as well as to an easy discharge of sanies, that is, of reddish black globules, mixed with a lymph, impregnated with salts. Hence it is, that the lips of the wound, continue obstinately moist, and cannot be deterg'd, without the greatest difficulty. Thus there will either be no cicatrix at all form'd, or it will be slowly produc'd, soft and easily destroy'd.

### XIII.

As the blood of pocky patients abounds with every minute, but extremely hard lymphale concretions, which pass through the minutest blood-vessels, but cannot insinuate themselves with the same ease, into other smaller vessels, such as those of the secretory kind, and especially the neuro-lymphatics of the soft parts, and the proper vessels of the bones ; and as

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these concretions produce in such minute vessels, obstructions which are the causes of all the symptoms of the pox, and which cannot be destroy'd, except by one means, which however is very efficacious; it follows, that when suppurations happen in such patients, (in consequence of a rupture, or obstruction in any part well nourished by sanguiferous or other vessels) they begin with the same vigour, and continue in the same manner, as they would do in sound patients, because the venereal concretions, prove no obstacle to the activity of the blood, and the pulsations of the sanguiferous vessels, and consequently neither weaken nor alter the efficient cause of suppurations. But when these kinds of suppurations have lasted for some time, and when the minute vessels of the divided part, have been weakned by the difficulty the fluids find to circulate through them, the blood-vessels may indeed, in some measure, disencumber themselves, but the lymphatic vessels will be obstructed by the lymphatic concretions. Neither is this surprising, since all the neuro-lymphatic vessels of the human body, are highly subject to obstructions, however sound they may be. For this reason, venereal ulcers become dry at the  
end



end of a certain time, without however being cured by that means; for though the circulation of the blood, is in some manner re-established in their adjacent parts, and the great inflammation dissipated, yet the course of the lymph is greatly retarded. Hence it is, that the ulcer is not deterg'd; that the small neuro-lymphatic vessels, which are the principal matter of the flesh regenerated in wounds, are not lengthened as they ought; that the lips of the ulcer remain hard; that the flesh does not vegetate, discharges little or no pus, is not extended, but becomes callous, and incapable of forming a cicatrix. But if some blood-vessels, which are free from the compression of the neuro-lymphatic vessels, which are filled with a coagulated juice, which has indurated them, vegetate under the form of fleshy granulations, these granulations will rise unequally, and will not be firm, because they will want a proper support, namely, neuro-lymphatic vessels, which ought to accompany them. Thus flesh will indeed be produced, but it will be flacid, moist, unseemly, dispersed here and there, like so many small eminencies, separated from each other, and incapable of forming a solid cicatrix. For this reason, in both cases,

venereal ulcers cannot of themselves be brought to a cicatrix, but having obstinately seized a part, will corrupt and destroy it.

BUT tho' pocky patients, as well as those who are found, are exposed to the action of all the occasional causes capable of producing *wounds*, and tho', in consequence of this, they may be wounded in any part of the body, and, consequently, be subject to troublesome suppurations, yet it often happens, that venereal suppurations are formed of themselves, especially in the lymphatic parts, or others of a similar nature. 'Tis true, that in such cases, the cause of these suppurations is internal; for, as we have already observed, the concretions in the blood of pocky patients, flow freely thro' the blood-vessels, but obstruct the small lymphatic and other similar vessels, which are too minute to afford them a passage, and, by this means, lay a foundation for their subsequent rupture. These lymphatic vessels when distended, compress some of the small blood-vessels, which in their turn being obstructed, and at last breaking, there is a suppuration form'd which is often slow, (*see article two, proposition one*) small and obitinate, which hinders the reparation of the lost substance, and the formation

of a cicatrix, on account of the difficult extension of the small neuro-lymphatic vessels, which are obstructed and indurated by the concretions contained in them.

As for sudden, speedy, and copious suppurations, excited by the venereal virus, as is observable in *gonorrhæas*, and certain *venereal buboes*, they ought to be ascribed to a speedy and considerable infection of the mass of blood, by means of which certain parts receive so large a quantity of these venereal concretions, that the blood-vessels are all of a sudden subjected to a strong compression by the obstructed lymphatic or spermatic vessels. Consequently many of those blood-vessels being too much distended by the blood, whose motion is retarded, and generally intensely hot in these parts, forthwith break, with many others, also obstructed from the beginning, which will supply abundance of pus, and prove a brisk and speedy cause of suppuration.

I AM of opinion, that the yellow, green, or other colour of the pus of pocky patients, only depends on the mixture of these venereal concretions.

## XIV.

IN a scropholous state of the blood, all its particles adhere too strongly to each other, but this adhesion prevails most considerably in the mucilaginous parts of the lymph, which is too glutinous, and viscid, to be easily corrected. When, therefore, suppurations happen in scropholous patients, they will be carried on pretty well for some time, because in the beginning the pulsations of the blood-vessels are sufficiently strong, and the fluids not too much engaged in the minute vessels. But the lymphatic vessels which are ruptured, will be soon after overcharged with the thick and viscid lymph they contain, (*especially if proper measures are not taken to assist the suppuration*) they will be obstructed, and rendered incapable, except with difficulty of freeing themselves from the obstructing humour. Hence arise the difficulty of deterging the ulcer, and the induration of its lips. *A continuing sore*

BUT in scropholous as well as pocky patients, it often happens, that suppurations are excited by internal causes, without the action of any external cause; for the lymph which is too glutinous and viscid, being incapable of a sufficient

ficient division by the action of the blood-vessels, to pass into the most minute lymphatics, easily stops in them, obstructs them, and produces a rupture of them. Besides, the distension of the lymphatic vessels, produces a rupture of them. And the distension of the lymphatic vessels produces a compression of those of the sanguiferous kind, and consequently an obstruction, and rupture of them. Hence a suppuration ensues, tho' not till a long time after, because the obstruction and pulsation of the vessels are produced by little and little, and because the liquors included in the ruptured vessels, and which ought to be converted into pus, are thick, viscid, and escape the pulsation of the sound vessels. Hence it is, that in scropholous patients, suppurations are not carried on as they ought, last long, excite no troublesome symptoms, and are, as it were, latent. Hence it also happens, that the inspissation of the lymph, produces the induration, and tumor of the lips of the ulcer, which renders it of long continuance, and cicatrized with difficulty.

## XV.

IN a fever, the blood, and other humours, pass with difficulty thro' the capillary vessels, and the obstacle they meet determines, especially the blood, to flow with greater rapidity thro' the large vessels. When therefore a suppuration is accompanied with a fever, the small vessels of the divided part will be obstructed, and many of them broken, whilst these large vessels (provided the obstruction is not too great) will beat strongly. Thus the suppuration will become vigorous and copious, tho' it was languid at the beginning. Thus a fever happening in *buboes*, sometimes produces a suppuration of them, and that more copiously than would have happened without the fever. Thus it also happens, that *scirrhus tumours* which before remained unactive, are sometimes brought to a suppuration. Thus also, all phlegmonous tumors generally suppurate best when an acute fever is excited. But when the obstruction is excessive, all the vessels will be too tense, and succumb, under the weight of the fluids which oppress them. Thus the suppuration will be suppressed. (*See article I. proposition I.*) For this reason, the part which ought to suppurate will

will become dry, being too tense, inflated, and hot; or, if the obstruction, producing the fever, is so considerable as to occasion a total dilaceration of the texture of a part, this part will be seized with a gangrene. This is sometimes observed in *wounds*, when a violent fever is excited, as well as in the small-pox, where the intense heat of the fever excites such an heat in the pustules, and whole of the skin, that the suppuration is in some measure stopt, and even a gangrene sometimes suspected.

It would be too tedious to enter into a detail of all the other states and conditions of the mass of blood, since these we have already specified are the principal states of it, which produce any variations in the work of suppuration; nor will it be difficult, from what we have said, to deduce the manner in which the other qualities of the blood may produce variations in suppurations.

WE now come to examine the principal irregularities, and *anomalous appearances*, occasioned by the peccant state of the solids and fluids, contracted in the suppurating part, whether this alteration of the fluids depends on the whole mass of humours, or is produced  
only



only or principally in the part itself, by any cause whatever.

## XVI.

'Tis certain that in a phlegmon, the blood is thick and rarified, greatly distends, and with difficulty passes thro' the capillary vessels. Now these vessels thus dilated, are extremely tense, and beat with a great deal of force. Thus when any of these vessels are broken, a sufficiently laudable suppuration will happen; and the pus will be thick, well mixed, white, and sufficiently fluid. Then after a time sufficient for the detersion of the ulcer, the flesh growing on it will be firm, since it is formed by the uniform elongation of sanguiferous and lymphatic vessels, which are strong, robust, and intimately interwoven with each other, by which means a good and solid cicatrix will be formed.

## XVII.

Tho' the blood is not so thick, yet it is hotter in an *erysipelas*. It does not so greatly distend the capillary vessels, but these are strongly irritated, and rendered tense, not so much by the bulk of the fluid, which circulates  
difficultly,

difficultly, as by the incommodious contact of an hot and acrid blood. Thus when the vessels break, many of them are at the same time lacerated. Hence arise sudden and unexpected suppurations, which furnish a large quantity of highly fluid pus, which is sometimes yellow, on account of an admixture of some red globules of blood, which have not been sufficiently retained in the ruptured vessels, on account of their smallness, in order to be changed, and entirely destroyed, by the efficient cause of supuration. These suppurations are accompanied with a troublesome heat, and there is often mixed with the purulent liquor, an hot and acrid serum, composed of a lymph, too much attenuated by the acrid liquor transpiring from the erysipelas, which renders it very subject to be discharged from its proper vessels. This serum renders the pus still more fluid, and sometimes corrosive. Hence the ulcer will be deterg'd with difficulty; for the heat of the part dissipating the thin and fluid humour discharged from it, the lips of the ulcer sometimes become too dry. Thus we may expect to see a flesh entirely incapable of forming a cicatrix. But when the humour is not dissipated, either because it is not sufficiently thin, or because the

heat

heat is not great enough for its dissipation, 'tis to be dreaded lest there should be formed a sanious, and unequal flesh, because it is principally composed of blood-vessels, unaccompanied with the support of the neuro-lymphatics which have been destroyed by the acrid serum, so that such a flesh will be easily torn, discharge drops of blood, and rise unequally, by which means the cicatrix will be difficultly formed. Suppurations are troublesome not only in parts seized with an erysipelas, but also because in so considerable a dilaceration of the preter-naturally tense vessels in the texture of these kinds of wounds, the number of these that are ruptured greatly exceeds that of such as are sound, or because these last are too much distended by an hot blood, or spasmodically contracted, and incapable of beating regularly, then the strength necessary to the production of a suppuration, is totally deficient, (*see articles III. IV. and VIII. and corollary II. proposition I.*) and the mortification of the part is to be expected. But before this happens, there will be distilled from the ruptured lymphatic vessels, a yellowish serum, which sometimes finding no vent, forms vesicles; or if it finds any of them, is discharged from them externally. When  
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this thin and acrid serum is evaporated, there appear, brownish, dark-coloured, and blackish crusts; the part is covered with a true *eschar*, like that produced by a live coal, and this circumstance lays a foundation for its being called *carbuncle*.

## XVIII.

IN an oedema the blood circulates slowly thro' the capillary vessels, is thick, gross, and allows to escape from it a great deal of serum, which moistens the blood-vessels, relaxes them, and renders their pulsations languid. The lymphatic vessels are greatly distended by the serum, which cannot flow freely into the blood-vessels, thro' which it endeavours to return to the heart; so that the texture of the part swims, as it were, in the fluids. Hence when these parts come to suppurate, which happens rarely, because the efficient cause of a suppuration is languid, there will hardly be any pus formed, but rather the ruptured lymphatic vessels, will continually allow a more or less viscid serum to ooze from them, by which means the suppuration will be prolonged. (*See article VI. proposition I.*) The ulcer will also be long moist, with soft lips, which easily  
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become gangrenous, when the course of the blood is retarded in their texture; or the soft and flaccid vessels will produce flesh which is soft, flaccid, fungous, and incapable of forming any union, or cicatrix.

## XIX.

IN parts seized with a *scirrhus*, the blood circulates indeed, tho' very slowly. The vessels are gradually accustomed to this slowness of the course of the humours, and proportion themselves to it, by the weakness of their pulsation. The lymph also, and the humours peculiar to every particular part flow slowly thro' their respective vessels; and when the *scirrhus* is confirmed, there are other vessels thro' which the humours cannot pass, and in which they lose their fluidity, and become hard, and compact. Concretions of this kind, do, in some measure compress the sides of the other vessels, which entertain the remainder of life in the part, by means of the circulation of the blood, lymph, and other humours proper to the part; and as the inactivity of these liquors which the vessels contain, weakens their pulsations, so the compression now mentioned, lessens their cavities, which intercepts a portion  
of

of the fluid, which used to pass that way, and forces it to go off into the adjacent vessels, which are more pervious. This is one of the causes for which the smallest appearance of life does not remain in a scirrhus. 'Tis not therefore surprizing that, when a suppuration happens in a scirrhus part, it should be slowly carried on, and that the pus discharged from it, should be very inconsiderable in quantity, thick, and filled with small hard granulations, which are nothing else but indissoluble and angular lymphatic concretions discharged from some of the mortified, and ruptured vessels, since the efficient cause of a suppuration is too weak in such parts. Nor ought we to be surprized, that the lips of an ulcer, in a scirrhus part, should be dry and parched, since the minute compressed vessels being indurated, and continually obstructed, are incapable of lengthening themselves, that the flesh does not vegetate, that such ulcers remain so long, and so obstinately open, that they are not painful, that they always continue the same, and that they are without life, and more resembling a stone, than a part of a carcass. In a word, 'tis not astonishing, that persons live long under such

ulcers, whether in the external or more noble parts of the body.

## XX.

IN a *cancer*, the blood is thick and impregnated with salts, circulates with difficulty through the minute vessels, obstructs and distends them by its bulk, irritates them by its acrimony, and does not run off into the adjacent parts, as in a true scirrhus. The lymphatic humour, or others of a similar nature, such as the saliva and milk stop in these vessels, are inspissated in them, assume a saline quality, irritate and distend the vessels, and in some, preserve a certain degree of circulation, though in most, they are absolutely without motion, and form hard and tophaceous concretions, which by their hardness are injurious to the adjacent vessels; for the sound vessels, which are very tense, and especially the blood-vessels, which are dilated and half inflamed, at every pulsation, strike forcibly on this inspissated humour, as on a rough and unequal flint, which occasions excessive pains. Hence 'tis obvious, that a cancer may be look'd upon as an inflamed and highly painful scirrhus. When therefore any vessels break in such places, or when a

cancer



cancer comes to suppurate, the pus will be viscid, and discharg'd with difficulty; it will be principally composed of a thick and saline lymph, slowly expressed from the obstructed vessels. The lips of a cancer, thus ulcerated, will be inflated, unequal, hard, and mostly composed of neuro-lymphatic vessels, more or less obstructed, and of some others entirely indurated, in consequence of which, they must necessarily be lengthen'd unequally. Besides, the different cavities of the lips of the *wound*, being but slowly cleans'd from the pus they contain, this will, by its continuance, contract a very disagreeable smell. Besides, some blood-vessels, which have been too strongly, or too long compressed, obstructed, distended, and which have beat often on the hard and unequal parts, will now and then break, and discharge a blackish blood, which mixing with the pus, will communicate the same colour to it. Sometimes a copious hemorrhage will happen, when the blood-vessel opened, is a small artery considerably dilated. All the sanguiferous and neuro-lymphatic vessels in the part, having been obstructed for a long time, and being continually agitated by the adjacent vessels, will at last break entirely. The tophaceous

cious concretions they contain, will be softened by the liquors discharg'd from the adjacent parts, and a portion of the lips which were hard, will become more supple and pliant, just as it happens to a putrifying carcass. Thus the lips of the ulcer will become hollow in different places, whilst the parts will be gradually destroy'd, and converted into an abominable sanies. In this case, we say, that the cancer is in its full force, whilst it corrodes and spreads without any limits, because the obstruction and compression of the vessels, as yet pervious by such as are affected, are daily augmented, by which means the fluids of such vessels are inspissated, and contract bad qualities by their continuance. Hence it is, that a Cancer has both its bulk and putrefaction continually augmented. These are the causes for which cancers discharge not only a thick and ill-mixed pus, but also such as is fetid, greenish or blackish, resembling sanies, and sometimes the corrupted liquor, into which carcasses in putrifying are reduc'd, with this difference, that the enormity of the pain, accompanying the discharge of the pus, sufficiently demonstrates, that the part wherein it happens, adheres pretty closely to others which are still alive. This

is the reason why the lips of the ulcer always remain hard, unequal, subject to corruption, and retaining the characteristic of putrifaction and obstruction, in consequence of which, they grow under the same form, and are incapable either of producing good flesh, or forming a cicatrix, since they lay a foundation for expecting the continual and horrible destruction of the live parts contiguous to them.

## XXI.

As a cancer is to be regarded as a suppurating scirrhus, whose suppuration is accompanied with very troublesome symptoms, so there are other scirrhus tumours, which being at first of a good character, become insensibly soft, without producing either heat or pain, and are dissolv'd into a kind of a thick and viscid pus; for which reasons, these tumors are call'd *cold tumors*, such as the *athroma* *steatoma*, *meliceris*, *wens*, *ganglions*, and *strumous swellings*. The vessels obstructed in these species of tumours, are not so much of the sanguiferous, as of the lymphatic kind, especially if the tumor is seated in the glands. Or the vessels obstructed are the pinguiferous vessels, or those which form the glands of *clopton havers*, or the minute salivary

lival ducts. Thus when all these vessels happen to break in tumors of this kind, the number of the ruptur'd blood-vessels is very small, as well as of such as are obstructed and remain sound, and which alone would by their pulsations have been capable of producing a suppuration. These pulsations then will be very weak and ineffectual, whilst, on the contrary, the quantity of vessels of another kind, whether sound or entire, will be very considerable, and whilst these vessels will be fill'd with liquors, which are thick and unfit to be attenuated by the pulsations of the sound vessels: for this reason, the liquors will be slowly express'd from the ruptur'd vessels; they will also be thick, more or less insipid, pingious, and containing many concretions. Besides, as the fluids remain immoveable, and are inspissated in their vessels, they will sometimes resemble pap, and at other times foot, sometimes honey, and at other times glew, or some syrup. They will also differ from pus, both with respect to their quality, as is obvious from inspection, and with respect to their origin, since the blood does not constitute the matter of them, and since the pulsations of the sanguiferous vessels, have not almost at all contributed

contributed to their formation. We are not, however, to expect that laudable flesh should be regenerated as soon as such a part as we have described is freed from the liquors which obstructed them; for, 'tis also necessary, that the *cystus*, or bag, containing these liquors, and which is more or less thick, and sometimes resembles a membrane, should be entirely separated and disengag'd from the sound part. This bag or cover is not form'd, as some may be apt to imagine, by the reunion of the grossest parts of the liquors it contains, inspissated into pellicules, like that form'd on broth when cold; neither does it derive its origin from the production of new vessels, or new fibres, but from vessels which before existed in the part, and which are continuous with the adjacent blood-vessels, and are only portions of them, distended and obstructed by inspissated, inactive, and as it were indurated liquors; which produces an interruption in the organization of the sound parts, and hinders the elongation of the vessels, in order to form new flesh. But as soon as the *cystus* is entirely detach'd from the sound parts with which it was continuous, there will be a true suppuration, and

after

after the *deterfion*, flesh will be regenerated and a cicatrix formed.

## XXII.

IN a gangrene many vessels are mortified, When a gangrenous part therefore comes to suppurate, it will at first be very slowly (*see art. 3. prop. 1. and corol. 2.*) till all the mortified parts, which either cover the live parts, or are intermix'd with them, have been separated by the falling of an *eschar*, or by some other method. But before this separation is entirely accomplish'd, there will always be some cadaverous particles mix'd with the pus, which for that reason will be fetid during the first days, but will gradually become more laudable, in proportion as the mortified flesh is separated; and at last the ulcer will not differ from a common ulcer, since after the *deterfion*, new flesh will be produc'd, and a cicatrix form'd.

WHAT we have hitherto said concerning the varieties of suppuration, only relates to such as depend on the fault of the solids and fluids, in the very part suppurating, as is observable in the principal abscesses. 'Tis therefore easy, from what has been said, to discover what are the



the other principal varieties observable in tumors subject to suppuration.

BUT we now come to investigate the cause why suppurations differ, according to the different manners in which the parts have suffered a solution of continuity.

### XXIII.

WOUNDS made by incision, generally discharge a large quantity of blood, for which reason the vessels of the wounded part become empty, and either no inflammation, or a very gentle one is brought on; the efficient cause of a suppuration is either very weak or entirely wanting, and there is a very small quantity of the matter proper for the formation of pus. Thus flesh is soon regenerated, without any previous, or at least an highly gentle suppuration, and provided in this case we are at sufficient pains to keep the lips of the wound in contact, it will be quickly cicatrised.

### XXIV.

IN wounds made by pointed instruments, a considerable inflammation is excited, and the lips are sometimes so considerably inflated as  
hardly



hardly to permit the introduction of the probe. This happens because the point of the instrument having only cut some vessels and fibres, the discharge of blood is inconsiderable, and because the divided fibrils shrinking back as it were into themselves, vellicate those that are sound, to which they are joined, and in which they create a painful sensation; so that these too tense fibres do not afford a free passage to the humours, which for that reason are accumulated in the lips of the wound, and inflate them till its aperture is almost entirely clos'd up. For this reason parts which have been wounded by pointed instruments, and which are highly painful and inflamed, will require a long time to suppurate. (*See Article 4. Proposition 1.*) And if proper measures are not speedily taken, a considerable inflammation will be brought on, especially if the wound penetrates deep, and the discharged blood remains in the wounded part. Hence a copious suppuration will ensue, or even a gangrene, if the vessels succumb under the weight and bulk of the blood.

XXV.

IN violent contusions, the vessels of the wounded part are generally lacerated and confounded with each other. Thus the vessels which have remained entire, will be oppressed, and a mortification brought on. (*See Article 3. and Corol. 2. Proposition 1.*) or if they have still strength enough to beat strongly, the large quantity of ruptured vessels will furnish matter for a copious suppuration. Consequently it will require a long time to deterge the ulcer, and sometimes there will be generated soft and fungous flesh, both on account of the weakness induc'd on the sound vessels, by means of their long continued strong pulsations in such a suppuration, and on account of their relaxation by means of the extravasated humours which surround them, which must make them susceptible of a preternatural dilatation by the fluids conveyed to them, and of an elongation under the form of fleshy granulations very soft, and without a support, in consequence of which the formation of a cicatrix will be greatly retarded.

## XXVI.

As in burns of the soft parts, the vessels have been dried, lacerated, and confusedly mixed with the extravasated humours, we are not, in such cases, to expect a suppuration. (*See Article 3. Proposition 1.*) The sound vessels of a part in which every thing is thus confounded, are compressed on all sides, the fluids, being no longer able to circulate in them as before, obstruct them: They beat more strongly than usual, and make an effort to excite a suppuration in the ruptured vessels intermixed with them, and from which they express the liquors copiously, since the number of ruptured vessels is very considerable. This expulsion of stagnant liquors weakens, and at last totally destroys, the union between the *eschar* and the sound part, which at last appears uncovered. The pus, however, furnished by the live parts, is always mixed for some time, with remaining particles of the *eschar*, which communicate to it a bad smell. But at last the suppuration becomes absolutely laudable, and the ulcer being deterged, a cicatrix is formed. But if the vessels of the sound part lying under the  
eschar

eschar are weak and tender; or if the eschar is so large as to oppress them by its bulk, they will be violently obstructed: Hence a gangrene will ensue, or at least a slow, weak, and latent suppuration, and the ulcer will not be deterged without difficulty. In a word, when in burns the sound vessels have retained some degree of elasticity, but have been dried by the impression made by the burning body, troublesome suppurations, accompanied with a considerable heat, will ensue. (*See Article 7. Proposition 1.*)

## XXVII.

IN parts which have been injured, and as it were burned by intense cold, either the vessels are ruptured or obstructed by liquors coagulated in them, and being totally deprived of life and motion, they are ready to burst. In a word, they become mortified, and consequently will never suppurate, but become dry; and fall off in the form of a crust; or, what happens more frequently, they will become livid, and be changed into a corrupted humour, like that discharged from gangrenous parts, which will soften the sound adjacent parts.

This, join'd to the inspissation the humours have already contracted, will still retard their motion more. Hence arise the spreading of the gangrene, or at least a languid, and as it were suffocated suppuration; the difficulty of deterging the ulcer; the production of soft and fungous flesh; and the long time requisite for the formation of the cicatrix.

## XXVIII.

IN wounds made by corrosives, the dilatation of the vessels is considerable; for which reason if the wound penetrates very far, the part will fall like an *eschar*, or be seized with a putrefaction, if it is too moist, and in this case all the circumstances mentioned in the preceding article may be observed. But if the number of lacerated vessels is not great, and if in the interstices of such as are ruptured, or under them, there remain many which have not felt the action of the corrosive, and whose pulsations are sufficiently strong, the suppuration will then be very copious. The pus discharged will be mixed with portions of the *eschar*, or of the putrid liquor oozing from the

the parts. Thus all we have observed in *Article 22.* will happen

## XXIX.

WHEN a suppurating parting is every where open, the pus may be totally discharged from it in proportion as it is expressed from the vessels in which it is formed, in which case, the ulcer is easily deterged, because the pus by its continuance proves no obstacle to the vegetation of the flesh, and the formation of the cicatrix.

## XXX.

WHEN an abscess, or a latent and conceal'd suppuration happens, the pus discharged from the ruptured vessels of the suppurating part, does not find vent externally, but is collected and accumulated in the texture of that part; for being continually pressed by the same force which produces the suppuration, it gradually insinuates itself into the interstices of the fibres, which it insensibly and easily destroys; because as there are many ruptur'd vessels in the suppurating part, the fibrils which united them are also broken, in consequence of which the

pus fills the space formed, and inflates the part. Hence it is, that when the suppuration is completed, and the violent symptoms which preceded it allay'd, there is a collection of pus included in a place shut up every where, and which instead of being hard, tense, inflamed, and painful, as it was before, becomes soft and free from pain. The pus being thus included, it either remains without finding an issue, or is discharged either by natural or artificial means. Nature, on this occasion, only makes use of the contraction of those fibres which form the basis of the tumor, which being strong, compress'd the volume of the pus, and oblige it to make an effort against the sides of the cavity, which being slender, are rais'd to a point, till at last the distension becoming excessive, they burst. When a vent is thus made to the pus, and frequently to the extravasated blood mixed with it, we deterge the ulcer; the sides of the cavity of the abscess by their natural contractile motion come into contact, the flesh afterwards vegetates, and the cicatrix is at last formed. But when an abscess does not discharge its contained pus, either by nature or art, troublesome symptoms are



are brought on; for besides that the pus by its bulk distends, and vellicates the fibres, keeping them in that state, it also by its stagnation contracts bad qualities; for it becomes acrid, irritates the part it touches, and forces them to contract themselves, by which means the course of the fluids is stopt in the sound vessels. For this reason, the inflammation which was removed, will begin afresh, and be succeeded by a new suppuration, which will consume and destroy the part still more. Besides, when the pus collected in a part does not find a free vent, it makes roads for itself in the interstices of all the parts, especially of the muscles, by which means it extends and diffuses itself every where. The force which on these occasions propels it, is the same with that which makes an abscess burst in a place which makes less resistance; namely, the contractile force of the fibres, which continually forces the pus to the parts where there is the least resistance, almost in the same manner as paste when press'd in the hand makes its escape through the interstices of the fingers. We may easily explain by this mechanism how sinuses and fistulas are formed, and how  
abscesses

abscesses burst without having recourse to the corrosive quality of the pus, which is very often only imaginary.

## XXXI.

As a *vomica* or impostume is only an abscess included in a cystus or bag, all we have said on the collection of pus in the substance of any part, relates to the generation of this cystus which includes the pus of *vomica*'s. It is not to be believed, that it is a pellicule formed by a portion of inspissated pus. But the extremities of the neuro-lymphatic vessels, obstructed by a thick fluid, and in some measure indurated, form the sides of the abscess which include the mass of pus, and which are of a very different consistence from the substance of the part. (*See Article 21.*) Hence it is, that the pus of a *vomica* being thus shut up, cannot go from part to part, nor be discharged till the cystus is broken. We ought not however to look upon the part as deterged, and proper to have a cicatrix formed, till the pus is evacuated; for the texture of the extremities of the neuro-lymphatic vessels, which are obstructed and indurated, and which,

as we have observed, compose the *cystus*, cannot be elongated under the form of flesh. For this reason the other vessels which are in a good condition, and beat strongly, as well as the fibres which form the texture of the part, being contracted, will agitate, thrust out by portions, and at last expel the whole *cystus*, which is nothing else, but, as it were, an inactive crust, which no longer sustains the mass of pus. The sound vessels being thus freed and disencumbered, there will be a laudable and gentle suppuration, the flesh will vegetate as it ought, and the part will be consolidated.

### XXXII.

WHEN there are sinuses in an ulcer, it often happens that the pus is not discharged in the same proportion in which it is express'd from the cavities of the ruptured vessels, either because the common aperture of the sinuses is too narrow, or not placed in a declining situation. In such cases we observe all the symptoms, which are brought on when an abscess finds obstacles to its freeing itself from the pus it contains; namely, fresh suppurations, and the formation of new sinuses, which  
are

are no less incommodious to the patient, than perplexing to the physician. It must however be confess'd, that as pus always in some manner or other discharged from the sinuses of ulcers, its continuance is not so dangerous for a suppurating part as when it has no vent, but is entirely included in an abscess. Besides, when the cavity of a sinus cannot discharge the whole pus it contains, and when any part of it remains too long in it, this pus being thus applied to the internal surface of the sinus, and being no longer agitated by the pulsations of the vessels, is inspissated by its continuance, and insensibly blocks up the orifices of the vessels, which ooze out a proper matter for its supply. The ruptur'd vessels, on such an occasion, cease to yield a purulent matter, which for that reason is inspissated in their cavities. In the mean time, the texture of the lymphatic vessels, which extends to the surface of the ulcer, is compressed, gradually obstructed, and at last hardly makes a discharge sufficient to moisten the internal part of the sinus. By this means there is formed a fistula, whose hard and callous sides prevent the vegetation of flesh, and much more the formation of a cicatrix.

WE now come in the last place to examine the varieties which happen in suppurations, produced by the faults committed in treating them. These faults are so gross and numerous, that a detail of them would require a whole treatise on the method of curing suppurations. But this defect is in a great measure supplied (*in Article 1. of Proposition 1.*) where I have observed, that resolvents improperly used, prove an obstacle to suppuration. In articles 4, 7, and 8, of the same proposition, I have given a reason why too hot and active topics, such as *vesicatories, caustics, acrid and spirituous remedies*, hinder and retard suppuration. In article 9, I have given a reason why a dressing which too much compresses the suppurating parts, either totally stops the suppuration, or renders it languid; and in article 10, I have shewn by what means *repellents, certain poisons*, and the *cold air*, stop a suppuration. In all these articles, I have specified the bad methods of dressing suppurating parts, and enumerated the reasons why such measures tend to prevent a suppuration. I shall at present examine some of these preposterous

sterous methods, which are too often observed in practice, and produce important changes in the work of suppuration, since they are absolutely inconsistent with the deterfion of the parts, and the regeneration of flesh.

## XXXIII.

WHEN due care is not taken to keep a suppurating part clean, the pus is so long applied to its surface, that it adheres to it, and is inspissated. Particles of the medicines applied to the ulcer, are also mixed with the pus, and become inspissated. These fordes block up the orifices of the ruptured vessels, in which the pus is accumulated, and gradually indurated, which either renders the lips of the ulcer callous, or suddenly produces inflammations of them, which either incommode the part and dry the ulcer, or excite a new and terrible suppuration. (*See article 15.*)

## XXXIV.

ULCERS often remain unseemly and fordid, either because the surgeon does not cleanse them often enough ; or does not change the ointments and other topics at every dressing,  
or

or applies to the surface of the ulcer, cerates, and plaisters, which by their too immediate contact, hinder the total evacuation of the pus. Other surgeons, on the contrary, injure *wounds*, and either prevent or retard their cure by an excessive regard to cleanliness ; for as they continually wash ulcers with *mineral waters*, *wine*, and *medicated decoctions*, and as with *lint* they too often cleanse the surface of the ulcer, they by such lotions and measures, not only remove the pus, but also soften the (as yet) tender vessels situated in the surface of the ulcer, by which means they weaken the efficient cause of suppuration, and hinder the ruptured vessels from discharging the pus in a laudable manner. Besides, these lotions excessively relax the texture of the parts, and lay a foundation for the production of soft and fungous flesh, which cannot be consumed without great difficulty. Surgeons, who too often cleanse ulcers, do indeed by that means remove the pus, but at the same time carry off the humour which oozes from the extremities of the vessels, and which communicates to them that degree of ductility so necessary to support the pulsations, which ought to deterge



the ulcer, and that degree of flexibility in the vessels, which is requisite to the production of new flesh. Those who cleanse ulcers rudely, with coarse lint, with the pus remove the tender vegetating flesh, and lacerate the minute vessels which begin to lengthen. These surgeons certainly act a preposterous part, because they do not consider that the soft matter, which covers the surface of the ulcer, only consists of extremely tender and delicate vessels, which contain no pus. By this means they destroy the work which provident nature has performed, in order to rectify their own errors. At last the minute vessels being so often lacerated and agitated, have their situation changed, and are confounded with each other. The blood and lymph also circulate with difficulty, and are accumulated in the soft, flaccid and half burnt vessels. After this there suddenly arises fungous flesh, filled with gross and sordid fluids; so that the too rude and frequent cleansing of ulcers, instead of detarging, renders them rather more sordid. But if the too strong compression or contusion of the minute neuro-lymphatic vessels, renders the lymph thicker, the texture of the part is at last

last indurated, and a *callosity* of the lips of the ulcer induced; for as the parts covered with integuments are indurated by daily labour, so the flesh of an ulcer becomes callous, by being too often and rudely cleansed.

### XXXV.

WHEN we frequently dress suppurating parts, we as often expose them to the contact of the air, which is prejudicial to them, not on account of the salts it contains, but only on account of the different degree of its temperature; (*See Article 10. Proposition 1.*) for tho' a vessel full of live coals is placed near the place to be dressed, in order to correct the intemperature of the air, yet it is hardly possible so to defend the part from its influence, but its natural heat must be, in some measure, altered or changed, or at least the volatile parts which maintained the due fluidity of its liquors dissipated; and as this change or alteration retards the course of the humours, both in the sound and ruptured vessels of the suppurating part, the work of suppuration is by this means considerably disturbed and protracted.

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